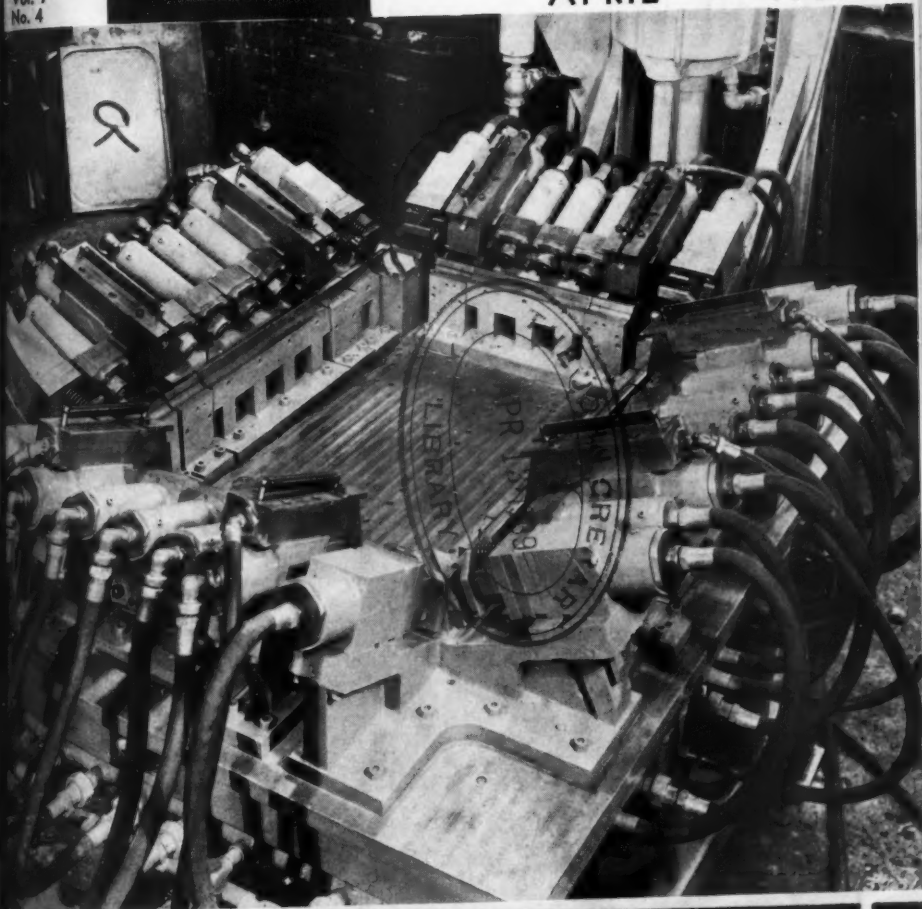


Refrigeration Service Engineer

Vol. 7
No. 4

APRIL • 1939



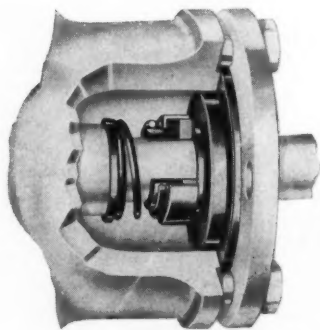


NEVER BEHIND THE EIGHT BALL with **ROTARY** *Replacement* **SHAFT SEALS** *for Refrigeration Compressors*

They take less time to install, give you a positive seal, last longer, cost you less and eliminate service "call backs."

**Write for Your Copy
of Convenient New
Wall Stock List**

**IMPROVED MODELS
LOWER PRICES
SEE YOUR JOBBER**



UNIT 1115



ROTARY SEAL COMPANY

805 W. MADISON ST., CHICAGO, ILL.

Continental European Office:

**Waldorpstraat 52
Den Haag, Netherlands**

Canadian Office:

**382 Victoria Avenue
Westmount, Montreal**



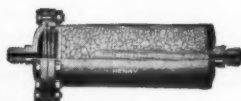
IN STEP WITH TRADE REQUIREMENTS

THE REASON Henry products keep their standing in the forefront of the industry is simple enough—to all they prove a source of steady profit. THE MANUFACTURER uses Henry products for the value that they add to his original equipment in increased efficiency and sales appeal.

THE JOBBER stocks the Henry line because it is complete, superior in quality, competitively priced, and easier to sell because of its exclusive features.

THE CONTRACTOR approves the advanced engineering of Henry products, their dependable performance, availability, and wider range of size and type.

THE SERVICEMAN approves them, too, because he knows when he installs a Henry product he is building up his business on the lasting basis of customer satisfaction.



TYPE 744
CARTRIDGE DEHYDRATOR
With Replaceable Cartridge



TYPE 888
COMBINATION
STRAINER and
Liquid Indicator

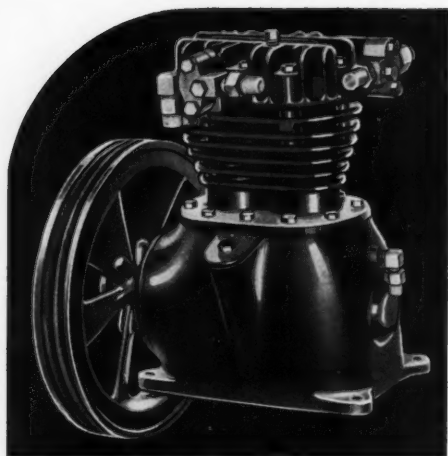
WRITE FOR NEW 1939 CATALOGS

CATALOG 84—Dryers, Strainers and Large Line Valves for Freon, Methyl Chloride and Sulphur Dioxide

CATALOG 53—Ammonia Valves and Forged Steel Fittings

HENRY VALVE COMPANY

1001-19 NO. SPAULDING AVENUE • CHICAGO, ILLINOIS



PAR

For **PEAK PERFORMANCE** **COMPRESSOR UNITS**

One of the PAR features that appeal to dealers and service men is the simplicity of this powerful equipment. In addition, it is sturdy—built to take the severest operating conditions in its stride—without fuss or bother. Capacities are large in all PAR Units; these precision-made, slow speed compressors are noted for long life and reduced servicing costs.

- *Large displacement—slow speed. Three-ring pistons (Cylinders diamond-bored and boned). Hardened crankshaft.*
- *Removable valve plate. Finned head and cylinders. Fan spoke, balanced flywheels. Bullseye oil gauge. Crankcase drain plug.*



PAR Compressor Units (2-cylinder model shown) are made in six sizes for various applications. The PAR Line also includes 28 models of complete highsides.

Send for **FREE CATALOG**
or see PAR units on display at your jobbers.

MODERN EQUIPMENT CORP., Defiance, Ohio

WITH



You Can Now Service FRIGIDAIRE METER MISERS

MORE PROFITS

A newly developed refrigerant tested and proven to function perfectly in the Frigidaire Meter Miser is now available to service men at your usual jobber source of supply.

Now you can recharge these units yourself and take your full profit.

If your supply jobber hasn't got HERVEEN, he can get it for you in 48 hours. Full details about this new gas, and how to use it will be sent free on request.

YOUR JOBBER

can get HERVEEN for
you in 48 hours. Ask him
for details.

Modern Gas Company, Inc.

1084 BEDFORD AVE., BROOKLYN, N. Y.

National Distributors of Refrigeration Gases

This is the working part

of an efficient dehydrator

To be good, a dehydrator must have a good drying agent inside; the drying agent does the work. Success in years of service and laboratory tests demonstrate that Activated Alumina is a drying agent you can depend on.

Activated Alumina works with all refrigerants. It traps the moisture out, and in addition it neutralizes any acid present. Thus it prevents further dilution, decomposition, and corrosion and restores the original efficiency of the refrigerant.

That is why leading makers supply dehydrators and replacement parts designed for use with Activated Alumina. You can get them from your jobber. Say "Activated Alumina" to him, to be sure of satisfactory results. ALUMINUM ORE COMPANY. (Sales Agent: ALUMINUM COMPANY OF AMERICA, 2159 Gulf Building, Pittsburgh, Penna.)

These Manufacturers Supply Dehydrators Charged with Activated Alumina

American Injector Co.
Fedders Mfg. Co.
Henry Valve Co.
Imperial Brass Mfg. Co.
Kerotest Mfg. Co.
McIntire Connector Co.
Mueller Brass Co.
Perfection Refrigeration
Parts Co.
Universal Cooler Co.
Weatherhead Co.



Reg. U. S. Pat. Off.

ACTIVATED ALUMINA

CURES CLOGGED REFRIGERATOR VALVES



*You'll find
them better*
ALL WAYS

STOCKED by leading
jobbers everywhere,
Weatherhead valves and
fittings include all neces-
sary and essential parts
for refrigeration installa-
tions.

Ask your jobber for
Weatherhead or write us
for the name of one near-
est you.

**THE WEATHERHEAD
COMPANY**
CLEVELAND, OHIO

WEATHERHEAD
Refrigeration Valves and Fittings

The Great New Giant Tiger Market in Wilmington, Delaware


Controlled by VALVES . . .

The "fine control and freedom from service" mentioned by Mr. C. S. Morash is one important reason why the leading Refrigeration Distributors have standardized on A-P Valves. They have found that this efficiency can be depended upon in installations of every size and type, from 1/4 ton and up.

- Reducing your valve service calls is one sure route to more Profits in Air Conditioning and Refrigeration—a clear road to greater satisfaction among your customers, providing a firm reputation for quality workmanship that helps sell your prospects. A-P Valves on the job give you greater assurance of a satisfactory installation.



● Interior Views of Refrigeration Installation of Giant Tiger Market, Wilmington, Delaware.



31st & Oxford Sts. Philadelphia, Pa.

GENERAL ELECTRIC
ALL STEEL REFRIGERATORS
HEATING EQUIPMENT
CUTTING & BENDING
MACHINES

BURNS EASY A/P VALVE

December 20, 1938

Automatic Products Co.,
Milwaukee, Wis.

Gentlemen:

Enclosed you will find pictures of the Giant Tiger Market at Wilmington, Del., which is the most recent of our installations for this food store chain.

In this, as all of our other installations, we use General Electric Compressors, Kramer low-sides and A/P valves.

At this time we want to express our complete satisfaction with the fine control and freedom from service which we have enjoyed since using A/P valves. Our valve service calls have been reduced materially.

Very truly yours,
JUDSON G. BURNS

C. S. Morash
C. S. MORASH, MGR.
COMMERCIAL REFR. DEPT.

CHM:D

AUTOMATIC PRODUCTS COMPANY
2454 NORTH THIRTY — SECOND STREET
MILWAUKEE WISCONSIN

Export Department, 100 Varick Street, New York City

Refrigeration Parts Jobbers, Who Recognize Quality, Stock A-P Valves

DEPENDABLE

THE BYWORD FOR A-P CONTROLS



No. 205
Expansion Valve

STRAINERS and FILTERS *for every need!*

● Mueller Brass Co. Strainers and Filters are manufactured throughout with non-ferrous metal, and have a polished natural metal finish. All tubular types are fabricated from brass or copper pipe with forged brass outlets soldered in place. Other types are made from brass forgings.

All Filters and Strainers are designed to insure efficient passage to the maximum refrigerant volume that is generally used in any particular size refrigerant line. The range is exceptionally complete—one for every specific purpose.

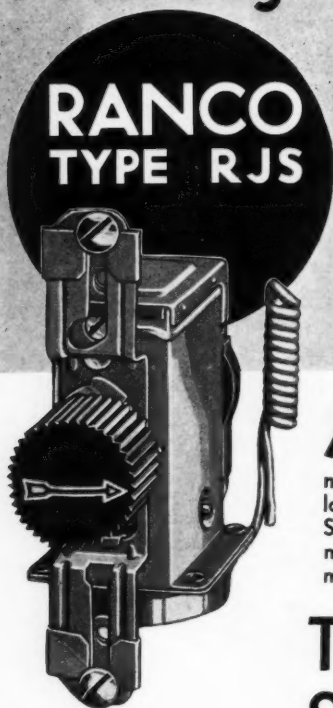
Write for literature on A-13661 Line Filter—inexpensive and with a maximum efficiency.

Order through your jobber



MUELLER BRASS CO.
PORT HURON, MICH.

A Ready-Made Market Awaits This Newest RANCO General Replacement Control



A GAIN Ranco is ready—with an easily installed, completely dependable general replacement control for the majority of new-model household refrigerators having overload protection built in the motors. Stainless Steel Construction. Outside differential adjustment. Designed for either vertical or horizontal mounting.

TYPE RJS—Fits All SINGLE DIAL Control APPLICATIONS

BECAUSE this control has adjustable mounting brackets and a long dial pointer shaft, it can easily be mounted in all single dial control applications. Dial pointer serves for cold control, defroster and on-off switch—and can be quickly positioned to line up with dial markings on all printed evaporator shields. A light socket is available which can easily be attached directly to the insulator of the control.

Type R J S is a precision instrument of true Ranco quality—simple in design, positive in action—sturdily built for dependable performance.

Ranco INC.

Columbus, Ohio

The Refrigeration Service Engineer

Vol. 7

No. 4

April 1939

A Monthly Illustrated Journal Devoted to the Interests of the Refrigeration Service Engineer in the Servicing of Domestic and Small Commercial Refrigeration Systems and Oil Burners

Official Organ
REFRIGERATION SERVICE
ENGINEERS SOCIETY

Cover

Nash-Kelvinator now uses this quickly adjustable progressive hydraulic punching fixture to punch from 22 to 52 holes in five different size refrigerator door panels. See article on page 60.

Published by

Nickerson & Collins Co.
433-435 North Waller Ave.
Chicago

Telephones Austin 1303-1304-1305

EASTERN OFFICE

420 Lexington, New York City
Telephone Lexington 2-4816

Publishers of Technical Books and Trade Journals Serving the Refrigeration Industries for 48 years.

Subscription Rates United States \$2.00 per year. Single copies 25c. All other countries \$3.00 per year.

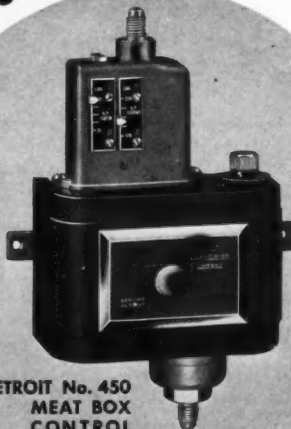
Copyright, 1939,
by Nickerson & Collins Co., Chicago

TABLE OF CONTENTS

Simplified Air Conditioning (First Article), by George G. Borden.....	11
A Small Drum Charging Board.....	14
Building a Refrigeration Analyzer (Third Article), by E. N. Avery.....	15
Moisture in Refrigerating Systems (Second Article), by E. W. McGovern.....	18
Salesmanship in Service Work, by E. P. Sorensen	24
Service Kinks	26
Building a Charging and Testing Board, by R. E. Meeker	26
Question Box	31
Hermetic Units	31
Refrigerant Dryers	34
Moisture in Freon Jobs.....	35
Plaster Paris	35
Detroit Lubricator Visits the Pacific Coast.....	36
New England Jobbers Sponsor Refrigeration Exhibit	38
R.S.E.S. News	40
Central Arizona Chapter Receives Charter....	40
Chapter Notes	42
Ladies' National Auxiliary.....	49
Pittsburgh Ladies' Auxiliary.....	50
Controversy in Central New York Chapter....	50
New Self-Contained 5 and 10-ton Conditioners....	50
New Metal Case for Recording Thermometers....	51
Imperial Introduces Copper Tube Manifolds Sold in Bulk	52
New Catalogs and Bulletins.....	54
Manufacturers' News	56

Invented

BY A SERVICE MAN
FOR SERVICE MEN



DETROIT No. 450
MEAT BOX
CONTROL

The *High Pressure Cut-In* feature of the new No. 450 Meat Box Control is designed to eliminate at least two service calls a year—service calls made necessary by seasonal temperature changes which prevent the conventional pressure type control from cutting in. The development of this unique feature is the result of an invention by a serviceman who wanted some means of automatically overcoming these cold weather conditions, and eliminating the resulting service calls.

Where the compressor is located in an unheated space, the *High Pressure Cut-In* feature automatically starts the compressor when the high-side pressure drops to an adjustable, predetermined point. After starting, the low-side control automatically takes over. This eliminates failure of the system to operate in cold weather. It also prevents freezing of water-cooled condensers because it cycles the system before temperature at the condenser falls to freezing.

Trouble with bad humidity conditions within the Meat Box and spoilage of meat through water condensation and slime caused by long off periods is prevented by more frequent cycling.

Thus does the Meat Box Control eliminate a large percentage of Control service calls,

provide more satisfactory system operation and materially reduce meat spoilage.

With the Meat Box Control the user can easily change the cut-out point by means of an external knob adjustment. In that the cut-in setting is "fixed," any adjustment in the cut-out point will not affect the cut-in setting. This is important, because any change that the user may make in the cut-out setting will not affect the defrosting cycle. A specially calibrated range plate shows the correct setting for defrosting cut-in for each of the three common refrigerants—Methyl Chloride, Sulphur Dioxide and Freon.

Included in the No. 450 series Control Switches are pressure and temperature type instruments, either with or without a high pressure cut-out. These instruments embody several new and exclusive features. Write for Bulletins 181 and 182.



DETROIT LUBRICATOR COMPANY

General Offices: DETROIT, MICHIGAN

Division of American Radiator & Standard Sanitary Corporation
London Representatives: Railway & Engineering Specialists Ltd., Montreal, Toronto, Winnipeg

The Refrigeration Service Engineer

Vol. 7, No. 4

CHICAGO, APRIL, 1939

\$2.00 per Annum

First Article

Simplified Air Conditioning

This is the beginning of a new series of articles on air conditioning which will cover the basic knowledge on the subject from the viewpoint of the service engineer.

By GEO. G. BORDEN

LIKE all big businesses, air conditioning was slow in getting started because early systems were costly, were clumsy in appearance and often operated unsatisfactorily. Much had to be learned about handling cold air and cold air controls. Little data was available and hence much experimentation had to be done on the customer's premises. In the past three years, however, much practical data has been collected and much experience has been gained so that today, neat looking installations can be made quickly at a fraction of the former cost and, best of all, these jobs will work as intended. As more and more equipment is sold, this cost will continue to decrease.

Packaged Type Unit Gaining Favor

Up until recently, air conditioning was strictly a tailor-made business. However, much field experience and a growing volume of business has enabled manufacturers to produce a number of packaged type units

which can be readily adapted to most jobs. These units at the present time are supplied in about four sizes:

- ¾-hp. air-cooled models
- 2-hp. water-cooled models
- 3-hp. water-cooled models
- 5-hp. water-cooled models

The industry expects to have a packaged type 10-hp. model soon.

Because these packaged-type units are completely self-contained they lend themselves readily to methods of mass production with a resultant saving in total cost per ton of refrigeration. These units are completely assembled, charged with oil and Freon, tested and crated like an ordinary household refrigerator. In many installations, these units can be used without ducts so that the installation man has only to make a window and an electrical connection on the air-cooled models and only a water supply and drain connection on the water-cooled models. In case ducts are required to distribute the conditioned air, these can be attached to the

units readily. Hence, installation time is cut to a minimum and one of the costliest parts of former air conditioning installations has been practically eliminated.

Then, too, because all parts of the complete system are located in one cabinet, refrigerant and electrical lines are short with few connections. Also, since the manufacturer selects the proper fan, coil and compressor equipment, little trouble can develop due to mismatched equipment. Thus the packaged type air conditioning equipment is relatively free from service and installation troubles.

These factors seem to indicate that the air conditioning service and installation man is becoming less important. But because of mass distribution of air conditioning equipment and because air conditioning equipment operates under different conditions from refrigeration equipment, good installation and servicemen are going to become more valuable and more in demand. But a good air conditioning man must be more than a mechanic. He must be a professional man who understands his business thoroughly not only from a mechanical point of view but from a theoretical point of view as well. He must thoroughly understand how mechanical parts of the system work, how the air passes through the machine, and how the capacity of the system will vary as air under different conditions passes through the machine. The time is fast approaching when air conditioning equipment will be sold through radio dealers, refrigerator dealers, hardware dealers and other similar merchants in small towns. In these cases the installation and service man will no doubt have to select the equipment, as well as install and service it.

Servicemen will also have to learn to use air conditioning instruments in order to properly check jobs. They will have to learn to use sling and aspirating psychrometers, psychrometric charts, Pitot tubes, velometers, anemometers, and draft gages. They will have to know how to set thermostats and humidistats. They'll have to have a working knowledge of one and two-pipe steam heating systems and hot water systems. They'll have to learn about circulating pumps and two-speed compressor motors and controls.

The purpose of this series of articles is to give to the practical service engineer in every day language a working knowledge of the principles of air conditioning so that by self study he can gain a knowledge of

those facts about air conditioning that will make him more valuable to himself and to his chosen industry.

The Two Broad Fields of Air Conditioning

Air conditioning in general is divided into two broad fields—the industrial field and the comfort and health field.

Industrial air conditioning is the business of producing favorable air conditions for industrial purposes. For instance, air conditioning in a printing shop provides air conditions which will allow ink to dry quickly—air conditioning in a candy factory will keep candy from getting sticky or chocolate from changing color—air conditioning in a drug factory enables the year around manufacture of certain tablets that were formerly manufactured only in winter months when the atmosphere was dry.

Comfort and health air conditioning on the other hand is the business of producing air conditions that sponsor comfort and health for human beings. In summer time, air conditions are too hot and muggy for the average individual. Hence, in summer, comfort and health air conditioning will cool and dry the air. In winter time air conditions are too cold and dry for comfort and health and hence comfort air conditioning in winter must heat and add moisture to the air.

Which Field Will Be Most Lucrative

The industrial air conditioning field can be likened to the industrial refrigeration field in that large tonnage machines are used and that much engineering goes into the planning and layout of these jobs. And when service is required, the average service engineer can not handle it because the cost of many special parts for the system is too high to enable him or a local distributor to carry the stock of repair parts and because refrigeration service cannot be interrupted for a period of time while parts are obtained without a large loss in products. Hence, the large commercial and industrial field of air conditioning will not be a source of income to the average installation and service engineer because he is financially unable to take such work.

On the other hand, the comfort type of air conditioning equipment especially in sizes up to 10 tons can be readily handled by the average service department because many of the parts for these systems are reasonable enough in price to be carried in

stock either by the service station itself or by a local distributor.

Hence, in this series of articles, we will discuss in particular, those factors which affect the comfort field of air conditioning.

Basic Principles

In order to build a substantial house, it is necessary to build a substantial foundation. Likewise, in order to properly master a technical subject, it is essential that a man lay a good solid groundwork of basic principles before he can hope to assimilate knowledge about various interconnected branches of that subject.

Let us start this series of articles by learning a few fundamental physical facts about the factors that affect human comfort and about air and its properties.

The Human Body—A Heat Machine

Before we can understand how to produce comfortable conditions and the factors which affect comfort, it seems in order to learn a little about the human body and how it functions. This knowledge, it seems, should really be the basic foundation for a study of comfort and health air conditioning.

The human body is a heat machine. In fact it can be readily likened to the furnace that supplies heat to the boiler on a steam engine. Coal and air are drawn into the furnace where they unite. As a result the coal is burned and heat is liberated. Some of this heat goes into producing steam which when properly directed can be used to do useful work. Another part of this heat is thrown off from the boiler by radiation and convection; also some heat is lost in the hot gases that pass out the chimney.

Food and air are taken into the human body where they are burned. Some of the energy formed by this burning operation is available for useful work. However, in the normal healthy body more heat is generated than is required to do useful work and as a result, the body has to throw off heat continually in order to maintain the required body temperature of 98.6 degrees Fahrenheit. If heat is thrown off too rapidly by the body, the person feels cold or chilled. On the other hand if heat is not thrown off fast enough the person feels hot and uncomfortable. When a person is unhealthy and something interferes with his heat regulating system, the body does not lose heat fast enough, the body temperature rises and

the person is said to have a fever. In order to remain healthy the human body must be able to cool itself continuously so that it can maintain the required 98.6 degrees temperature. And our problem in comfort air conditioning is to make air conditions that will allow the human body at all times to cool itself at the proper rate.

The human body loses heat by radiation, convection and evaporation.

Radiation

It is a well known physical fact that heat always travels from a higher temperature object by invisible waves or rays to the

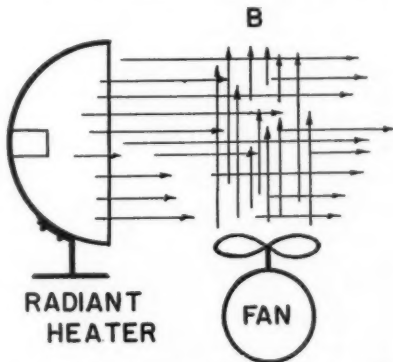


Fig. 1. Even though the fan blows air across the heat rays, no heat is felt at B, proving that radiated heat is not affected by air currents.

lower temperature object. The greater the temperature difference between the objects, the faster heat will flow from one object to the other.

As an example of radiation, consider an ordinary electric heater such as shown in Figure 1. If you stand in the direct invisible rays of the heater, you will start to feel warm, yet if you step out of the path of the rays you will not feel the effect. And if you place a fan at A and stand at B the heat will be deflected by the air from the fan to you. In radiation heat travels from the hotter object to the colder object by direct rays which are not acted on by air currents. As another example of radiated heat consider the sun's rays. You can be comfortable on a cold day if you stand in the sunshine, whereas if you stand in the shade, you feel cold.

The body loses some heat by direct radiation to colder objects in the room. Because

the body is at 98.6 degrees and the object in the room may be from 70 to 80 degrees, heat flows from the body to these objects. But because the difference in temperature between the body and these objects is small, the body loses only a small amount of heat by radiation.

Convection

Convection is the method of transferring heat by air currents. As an example of convection consider an ordinary cast-iron radiator. When air comes in contact with a hot radiator, the air picks up heat from it and as the air gets warmer, it gets lighter and rises above the radiator. It is replaced by cold air from the floor which also picks up heat and rises. Hence convection is the method in which heat is transferred from a hot object by air coming in contact with it. In the case of the radiator we can speed up heat removal from the radiator by putting a fan under it which will force more air per minute over the radiator.

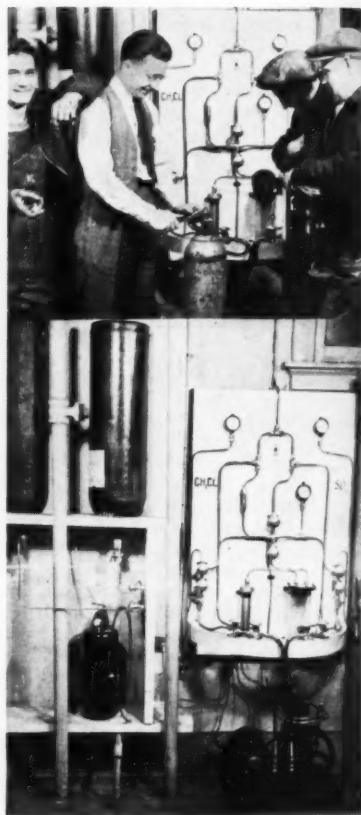
The body throws off heat similar to the radiator in that comparatively cool air contacts a person's skin and clothes, absorbs heat and rises, and is replaced by cooler air. If we want to speed up heat elimination, we can stand in the path of air from a fan. We get a cooling effect from a fan in the summer time partially from the fact that we have speeded up convection air currents over our body.

Evaporation

Evaporation is the process of changing a liquid into a gas. As we know from the cycle of refrigeration, when a liquid is changed into a gas, a large amount of heat has to be absorbed by the liquid. (In evaporating one pound of sulphur dioxide approximately 168 B.t.u. are absorbed. In the case of Freon, approximately 72 B.t.u. are absorbed in changing one pound of liquid to gas.) In the case of water, approximately 1050 B.t.u. per pound must be absorbed to change one pound of water at 98 degrees into one pound of water vapor at 98 degrees. Hence when a human body throws off water in the form of perspiration, the liquid perspiration is vaporized by the air surrounding the body. For every pound of perspiration thrown off the body loses a large amount of heat. If we want to speed up perspiration we stand in front of a fan. Because more air is blown over

the body, more perspiration evaporates and we feel cool. Thus the cooling effect we get from a fan is due to the evaporation of moisture from the skin as well as the effect of speeded up convection air currents. We will study evaporation more in detail later in our study of the properties of air.

(To Be Continued)



A SMALL DRUM CHARGING BOARD

Here are two views of a charging board built by Curran Refrigeration Service, Denver, Colorado, for Refrigeration Parts and Supply Co. of the same city.

In the upper picture are shown from left to right, Fred Decrentis, H. R. McCombs, James O'Connell and Wm. Reiter. Mr. McCombs is connected with the Refrigeration Parts and Supply Co.

In constructing the board, Imperial hand valves were placed so that a vacuum can be pulled on any or all parts of the board. The glass container shown on the lower left traps any oil or sludge which may be pulled from the drum being evacuated. The compressor is used only for evacuating purposes and pressure is created in the large drum by a torch. The entire arrangement has proved very satisfactory.

Building A Refrigeration Analyzer

(THIRD ARTICLE—Continued from March)

Concluding his series of articles on this useful piece of equipment, the author explains the method of making tests with the completed instrument

By EDWARD N. AVERY

Diagrams referred to in this article are reproduced in the February and March issues—Editor.

IN describing the various operations and tests possible with the analyzer, each operation will be listed separately so that they may be used for reference purposes if necessary. It will be observed that the refrigeration end of the analyzer is almost identical to the conventional charging and purging gauge block, the only exceptions being the addition of a third valve C and a liquid indicator in each of the connecting lines. All operations are therefore practically the same and the refrigeration service engineer should have no difficulty in mastering them.

Connecting the analyzer: Connection is made between port S (Fig. 3) and the suction service valve on the unit to be tested; likewise port H is connected to the discharge service valve. Two flexible charging hoses are used in making these connections as they allow a certain amount of movement and do not become stiff after repeated bending as would copper tubing. Since these hoses are always plugged up with a flare plug when not in use, it is not necessary to purge the air out of them after the first time. In testing a unit using a different refrigerant, however, it is well to purge out the refrigerant contained in the analyzer. The refrigerator line cord is then removed from the wall outlet and placed in outlet (10). Extension (3) is then plugged into the wall outlet and the motor base (1).

Starting and stopping the unit: With the refrigerator thermostat turned to the high position, switch (9) may then be used to start and stop the unit. This one feature alone makes the analyzer well worth while since it is no longer necessary to get off the floor, open the refrigerator door and manipulate the overload button each time it is necessary to start or stop the unit.

Reading pressures: With valves S-C and H in their normal or closed position, both service valves on the unit may be cracked off their back seats and the suction and head pressures may be read on their respective gauges.

Reading line voltage: By throwing switch (7) to the on position the line voltage may be read on the voltmeter. A sustained drop in voltage of more than 10 percent after the unit is started is an indication that there is either a loose connection to the wall outlet, inadequate wiring in the home or a lack of sufficient power as supplied by the service company. Each of these items may be checked separately by applying the voltmeter at the various points and taking readings both with the unit idle and in operation. Since a slight voltage drop is always apparent good judgment must be used in connection with this test.

Reading ampere draw of motor: By turning switch (6) to the on position, the ampere draw of the motor may be noted on the ammeter. Care should be taken to take ampere readings only after the unit is running as the heavy starting current would prove to be a severe strain on the ammeter. Since the amount of current required by the motor varies with the load and changes directly with the suction and discharge pressures, good judgment must again be exercised here before condemning the motor. By removing the belt and again applying the test a further check may be obtained.

Reading motor terminal voltage: By applying the clips of extension (9) to the motor terminals, turning switch (7) to the off position and plugging into outlet (8), the motor terminal voltage may be read on the voltmeter. If this is materially less than the line voltage at the analyzer panel, there is something wrong in the refrigerator wiring.



HERE IS A VIEW OF THE COMPLETED REFRIGERATION ANALYZER

Testing cold controls: As a further check on the above, the test clips may be shifted to the thermostat terminals at the motor and the voltage drop across the cold control may be noted. A full line voltage reading during this test indicates—First: A loose connection. Second: The overload button is out. Third: The refrigerator has reached the required low temperature and the thermostat has shut off. Fourth: The control element has lost its charge. Fifth: Some defect in the cold control.

Testing capacitors: Motor starting capacitors may be tested by first disconnecting them from the motor terminals and then applying full line voltage to them by means of extension (9). Switch (6) must be kept in the off position when making this test as the heavy current would burn out the ammeter if the capacitor happened to be shorted. The voltmeter should be left in the circuit and if the voltage drops to a very low level, switch (9) must be turned

off immediately and in no case left on for more than two or three seconds. If the voltmeter remains at or near 110 volts the capacitor is not short-circuited. Now by turning switch (6) to the on position and again applying the voltage for a few seconds the ampere draw through the capacitor can be measured. The apparent capacity of the capacitor may now be computed by means of the well-known formula:

$$\text{At 60 cycles, capacity} = 2650 \times \frac{\text{Amperes}}{\text{Volts}}$$

The result should not be less than the rated capacity but may exceed it by any amount up to 40 percent. If when making this last test there is no indication on the ammeter and the line fuse has not been blown by the previous test, then the capacitor is open circuited.

A few of these electrical tests may seem rather complicated but after wiring up the

analyzer the underlying principles will be apparent and no difficulty should be encountered.

Adding refrigerant: Refrigerant may be added to the unit in the vapor state by connecting the drum to port C, by means of the third charging hose, and cracking valves C and S. The drum must, of course, be placed in an upright position. By inverting the drum and applying heat to it, liquid refrigerant may be added by cracking valves C and H.

Adding oil: Oil may be added to the unit by first running the suction service valve in short and then drawing a vacuum on the crankcase. Now by attaching an oil line to port C and keeping the end under the surface of the oil in order to exclude all air, the oil may be drawn in by cracking valves C and S. The flow of oil may be observed in liquid indicator (16). Since the analyzer and the connecting hose will hold considerable oil it is advisable to close valve C and crack valve H at frequent intervals, in order to blow the oil over into the crankcase, unless a measured amount of oil is to be added.

Purging: By attaching purging hose to port C and cracking valves C and H the unit may be purged of air or excess refrigerant.

Checking condition of refrigerant and oil: By cracking valves H and S to a slight extent and observing liquid indicators (16) and (18) the condition of the oil and refrigerant may be noted. Any carbon or dirt present will make its presence known by appearing on the sight glasses. A better test is made by using the following method.

Observing liquid flow: The liquid line may be connected to port C and the charging hose on port H connected to the liquid line valve. Now by opening valves C and H the flow of liquid may be seen in liquid indicator (18).

Pumping out the analyzer: Since a considerable amount of refrigerant will condense in the analyzer and the connecting hose, it is advisable to return this to the unit upon completion of any of the above operations. This may be accomplished by back seating the discharge service valve and cracking valves S and H. After the refrigerant has evaporated out of the analyzer, the suction service valve may be back seated and the analyzer disconnected.

While the writer has attempted to cover most of the important service operations, many others will suggest themselves to the refrigeration service engineer after the analyzer has been used a few times.

Testing commercial units: The analyzer should be connected to the service valves as described for the testing of household units. Since the electrical end of a commercial unit is altogether different than that of a household unit, the following methods or variations of them must be used in connecting the electrical cords. In testing a 110-volt unit one of the plug fuses may be removed from the safety switch and replaced by plug (14). Extension (8) may then be plugged into (14) and the motor base (1). Short circuited cap (17) is then placed in outlet (10). Switch (9) may now be used to start and stop the unit and by turning switch (7) to the on position the line voltage may be read when the unit is idle. The ampere draw of the motor may be noted by turning switch (6) on when the unit is running. Care must be taken here that the ammeter is not subjected to too heavy a current for it to handle, since most commercial jobs draw plenty of amperes and the starting current in most cases would surely result in a burned-out ammeter.

Testing 220-volt units: In the event that the unit under test is a 220-volt job, extension (9) is plugged into outlet (2) and one cartridge fuse is removed from the safety switch and the test clips are placed on the top and bottom fuse clips. Short circuiting cap (17) is placed in outlet (10) and care must be taken to keep switch (7) in the off position as 220 volts would be too much for the 150-volt voltmeter to handle. Switch (9) may be used, as before, to start and stop the unit and the ampere draw, if not too heavy, may be noted on the ammeter by turning on switch (6).

Running unit regardless of pressure switch: By connecting test clips of extension (9) across the terminals of the pressure switch and plugging into outlet (2), then by using cap (17) in outlet (10), the unit may be run beyond the lower limit of the pressure switch.

If desired, the overload button may be pulled out, or if not so equipped, the pressure switch may be blocked in the open position and the full control of the unit is then placed in switch (9).

(Concluded)

Second Article

Moisture in Refrigerating Systems

By E. W. McGOVERN*

The last paragraph of last month's article stated that Cobalt Chloride impregnated paper is blue when damp, red when dry. A correction which arrived too late for the March issue reverses these colors—Editor.

Chemical Dryers

MOISTURE is commonly removed from systems containing the refrigerant and oil charges by means of solid chemical drying agents which are generally placed in the refrigerant liquid line, sometimes in the vapor line. The drying agent is ordinarily placed in a tube of a sufficiently large diameter that resistance to fluid flow is low and that the velocity of the refrigerant is cut down so as to increase time of contact with the drying agent. The drying tube is usually equipped with fittings at both ends so that it can readily be connected into or taken out of the equipment at any time. The tube must be equipped with suitable filters at each end to prevent escape of small particles of drying agent to other parts of the refrigerating system. These filters may be felt, mineral wool, glass wool or other efficient filtering material backed up by metal screens. The filters should be so designed as to offer low resistance to fluid flow, especially under conditions where a cake of fine drying agent particles may be built up.

Because of the special qualities required of drying agents for refrigerating systems, not all of the available and useful drying agents are suitable for use in refrigerating machines. Further, although excellent drying agents are available for refrigerating systems, none can be expected to be perfect as there is no limit to what we can theoretically ask of a material. We find that one material will excel in one point, another material in another point, and consequently we probably cannot say that there is one material that is better than all others for all applications.

*Chlorine Products Division, E. I. Du Pont de Nemours & Co. Paper delivered before the January meeting of the Illinois State Association, R.S.E.S.

There are two general types of drying agents: those that hold water by adsorption and those that combine chemically with water. The adsorbents hold water by physical attraction between drying agent and water and are characterized by a physical form of high porosity which presents an extremely large surface to the material being dried. For example, one cubic inch of the adsorbent Silica Gel is said to present an internal surface of over one acre. Drying agents that combine chemically with water may be divided into two types. The first type includes those in which the hydrated form is quite similar chemically to the anhydrous material and where, in general, the water is more loosely held. An example is calcium chloride CaCl_2 , which may take up water to form a number of definite hydrates such as the dihydrate, $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$. The other chemical type of drying agent actually reacts with water to form a new chemical entity. For example, calcium oxide, CaO , reacts with water to form calcium hydroxide, Ca(OH)_2 . Broadly speaking, neither the adsorbent type nor the chemically reacting type has an advantage over the other, although each type may at times appear to advantage in comparing individual drying agents.

In order that we may properly judge the various solid drying agents let us first consider what qualities are desirable. The following properties would be included:

1. Insoluble in refrigerant, water and oil.
2. Non-reactive with refrigerant and oil.
3. Non-corrosive, alone or in water solution.
4. High drying intensity or efficiency—low water vapor pressure.
5. High capacity—capable of taking up large quantities of water, preferably at high efficiency.
6. Rapid—short contact time with water required.
7. Not too rapidly (explosively) reactive with water.
8. Non-dusting—non-disintegrating.
9. Non-abrasive.
10. Acid removing or neutralizing.

TABLE III—REMOVAL OF ACID BY ACTIVATED ALUMINA AND CALCIUM OXIDE (1)

Sample No.	Contents of Sealed Glass Tubes			Acidity of MeCl as % by wt. HCl		Condition of MeCl Before
	Methyl Chloride	Activated Alumina	Calcium Oxide	Before	After	
1	25 cc	2.5 gm	None	0.153	0.0006	dry
2	25 cc	2.5 gm	None	0.153	0.0006	dry
3	25 cc	2.5 gm	None	0.153	0.0006	wet
4	25 cc	2.5 gm	None	0.153	0.0006	wet
5	50 cc	5 gm	None	0.0025	0.0005	wet
6	50 cc	None	2.5 gm	0.153	0.0003	dry
7	50 cc	None	2.5 gm	0.153	0.0003	dry
8	50 cc	None	2.5 gm	0.153	0.0006	wet
9	50 cc	None	2.5 gm	0.153	Sl. Alkaline	wet
10	50 cc	None	2.5 gm	0.0025	0.0000	wet

11. Capable of being reactivated.
12. Low in resistance to fluid flow (favorable physical form and particle size.)
13. Convenient and safe to handle.
14. Inexpensive.

Further explanation of these desirable qualities will appear in measuring the various drying agents up to them.

Individual Chemical Drying Agents

Activated Alumina, Drierite, and Silica Gel are probably the three best drying agents we have available for general use in refrigeration. None of these has yet been proved to have any particularly strong advantage over the other two that would permit calling it the best. Another useful drying agent, one which is not as foolproof as the above three and therefore must be used with special care, is calcium oxide. It has advantages which are helpful in certain applications.

Activated Alumina, a partially hydrated form of aluminum oxide, is an adsorbent type drying agent. It measures up quite well to all of the desired qualities and is un-

excelled in many. It is practically insoluble in water, in oil and refrigerants and is non-reactive and non-corrosive. It has a high drying efficiency, being capable of drying gases down to about 0.0004 grain of moisture per cubic foot. Comparative drying efficiencies of various drying agents according to J. H. Bower² are shown in Table IV. These values are for drying air, but the same relative order probably should apply when drying other materials. Data for refrigerants according to Dr. W. O. Walker³ are in Table V. Discrepancies between the two tables may be due to differences in conditions such as space velocities and degree of loading.

The capacity of Activated Alumina for adsorbing moisture is fair. It will not adsorb more than about 8 per cent of its own weight of water from liquid refrigerant but it can usefully adsorb as high as 15 per cent water from vapor not contaminated by oil. Its speed of taking up moisture is rather low compared to that of calcium oxide, for example.

As a drying agent takes up water, its drying efficiency drops. Since a slow drying agent may allow incompletely dried material to go through the dryer the first time the refrigerant passes through, the end particles of drying agent will soon take up appre-

² J. H. Bower, Bureau of Standards, J. of Research, 12, 246 (1934).

³ W. O. Walker, Refrigeration Service Engineer, 6, No. 3, 24-27 (1938).

TABLE IV—COMPARATIVE EFFICIENCIES OF DRYING AGENTS IN DRYING AIR (2)

Drying Agent	Volume Air per hr. per cc Dessicant liters	Total Air per cc Dessicant liters	Average Water Remaining mg. per liter air
Activated Alumina	65—135	6.5—7.7	0.005
Calcium Sulfate	75—150	1.2—18.5	0.005
Silica Gel	65—135	6.5—7.7	0.08
Calcium Oxide	60—90	7.6—10.1	0.008
Calcium Chloride	75—240	1.2—7.8	0.36

Apparently determined at 25—35°C. (77°—95°F)

chable amounts of water, and thus efficiency may be lowered earlier than would be the case with a rapid drying agent. Effective speed of drying can be increased by using a larger diameter drying tube, thus lowering the linear velocity of the refrigerant and increasing time of contact.

Activated Alumina is not too rapidly re-active with water. A rapidly reactive drying agent may become hot due to the heat of hydration. This is undesirable since drying efficiency (intensity) drops as temperature increases.

Activated Alumina has a low dusting tendency, which follows from its high resistance to shock, crushing and abrasion, and it does not tend to disintegrate on hydrating. However, as with all available drying agents, the fact that a drying agent dusts at all requires that efficient filters be used to prevent abrasion of moving parts of equipment, harmful solid deposits and in some cases, corrosion.

Activated Alumina, while neutral, is amphoteric; that is, it may react either as an acid or a base. It would not be expected to neutralize acids as does a basic material like calcium oxide, but we have found that it does remove hydrochloric acid from methyl chloride to a satisfactory degree. Whether this is due to adsorption of hydrochloric acid, aided by solution in adsorbed water, or to reaction with Activated Alumina to form aluminum chloride has not been proved. It is probable that aluminum chloride is formed at least after adsorption. Experimental data are shown in Table III.

Can Be Reactivated

Activated Alumina, if not contaminated by oil, readily lends itself to reactivation by heating at 350 degrees F. Reactivation after use in a refrigerating system is not practicable because of oil contamination. However, the reactivation property is valuable in recovering unused material that has picked up moisture by accident; for example, by exposure to moist air.

Being available in granular form of any reasonable size and showing low dusting tendency, Activated Alumina, like all commonly used drying agents, presents low resistance to refrigerant flow when properly used. Four to eight mesh drying agent is commonly used as this size presents a good balance between resistance to fluid flow and speed of drying. Of course, smaller particles, presenting more external surface, dry more rapidly.

Activated Alumina is convenient and safe to handle. Like all drying agents, it should be handled with minimum exposure to air. It is in approximately the same price class as other good drying agents.

Activated Alumina Graded

Grade C Activated Alumina, which is impregnated with calcium chloride, has double the capacity of Grade A, which is the material ordinarily supplied. While Grade C thus has an advantage especially for drying air and gases, it should not be used for drying refrigerants, because of possible corrosive effects of the calcium chloride.

Drierite, which is a porous form of anhydrous calcium sulfate, CaSO_4 , is unique among refrigerant drying agents in that it dries by both adsorbing water and chemically reacting with it. The anhydride adds water to form the hemihydrate, $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$, which in turn can take up water, though less efficiently, to form the dihydrate. A review of its qualities shows it to be very similar to Activated Alumina as a drying agent, and therefore most of the various points above covered need not be separately reviewed. We have no evidence as to its ability to remove acid. It would not chemically react with acid but might reduce acid to some extent, especially in a wet system, by adsorption. It is said to be less abrasive than either Activated Alumina or Silica Gel. Molded forms of Drierite are available and are in use in hermetic units. The molded material is placed in a finely woven degummed cotton bag and the whole is placed in the unit where it will contact refrigerant liquid.

Silica Gel is a highly porous form of silica, SiO_2 . Ordinarily sand is a non-porous form of silica. Silica Gel is an adsorptive material very similar to Activated Alumina in its drying properties. It, like Drierite, probably does not remove acid to a safe low percentage.

Calcium Oxide or unslaked lime, CaO , takes up water by reacting with it to form calcium hydroxide, Ca(OH)_2 , which is commonly known as slaked lime. It is alkaline in reaction and readily neutralizes acid methyl chloride as is shown by data in Table III. The main objection to its use is its property of disintegrating to a fine powder when it takes up water, often resulting in the fine particles passing an inefficient filter or creating high resistance to flow by block-

ing the filter. The particles are fairly soft and therefore probably not very abrasive. However, there is another possible undesirable consequence of their being free in a system in that both calcium oxide and calcium hydroxide react slowly with halogenated hydrocarbon refrigerants to form calcium chloride, which may cause corrosion. In spite of its disadvantages, calcium oxide has certain advantages for methyl chloride systems when used carefully as a temporary installation for a few days and followed, if necessary, by a permanent dryer charged with Activated Alumina, Drierite, or Silica

It may be noted that the rate for calcium oxide is very low.

The use of calcium oxide and other alkaline materials for drying refrigerating systems is claimed by United States Patent 1,809,883 assigned to the Chicago Pneumatic Tool Company.

Calcium Chloride, CaCl_2 , combines loosely with water to form hydrates. Its main disadvantages are its ready solubility in water and the corrosive effect of its water solution. Because of the possibility of calcium chloride solution being carried out of the dryer by rapid passage of a slug of water through it

TABLE V—COMPARATIVE EFFICIENCIES OF DRYING AGENTS IN DRYING REFRIGERANTS (%)

Dryer	Refrigerant	Phase		
		Treated	Percentage Remaining Water	
		L—Liquid V—Vapor	25% Initial Water	0.02% Initial Water
Activated Alumina	Sulfur Dioxide	L	.15	.005
Activated Alumina	Sulfur Dioxide	V	.01	...
Activated Alumina	Methyl Chloride	L	.02	.006
Activated Alumina	Methyl Chloride	V	.01	...
Drierite (Calcium Sulphate)...	Sulfur Dioxide	L	.15	.009
Drierite (Calcium Sulphate)...	Sulfur Dioxide	V	.08	...
Drierite (Calcium Sulphate)...	Methyl Chloride	L	.05	.008
Drierite (Calcium Sulphate)...	Methyl Chloride	V	.04	...
Silica Gel	Sulfur Dioxide	L	.15	.006
Silica Gel	Sulfur Dioxide	V	.01	...
Silica Gel	Methyl Chloride	L	.01	.004
Silica Gel	Methyl Chloride	V	.01	...
Calcium Oxide	Sulfur Dioxide	L	.20	...
Calcium Oxide	Sulfur Dioxide	V	.15	...
Calcium Oxide	Methyl Chloride	L	.15	...
Calcium Oxide	Methyl Chloride	V	.08	...
Calcium Chloride	Sulfur Dioxide	L	.09	.013
Calcium Chloride	Sulfur Dioxide	V	.03	...
Calcium Chloride	Methyl Chloride	L	.10	.005
Calcium Chloride	Methyl Chloride	V	.04	...

Gel. In addition to neutralizing acid systems, it has the advantage of rapidly absorbing water in the liquid line of methyl chloride systems. One pass removes a comparatively high percentage of water, and as a consequence, there is not so great a tendency for a system to freeze up a second time, while the dryer is on the system. Its theoretical capacity is high (82.1 per cent) but it should not be loaded beyond eight to ten per cent at most because of its disintegrating property. It should be used with efficient filters. A further reason for its not being used in permanent dryers is its tendency toward reaction with halogenated hydrocarbons. Table VI shows reaction rates of this and other alkaline drying agents with methyl chloride.

or due to overloading of the dryer, its use in refrigerating systems is not recommended. There is also a possibility of its contaminating the system and causing corrosion by escape of small particles past the filters or even by solution in the refrigerant. Calcium chloride is about 0.0024 per cent soluble in methyl chloride, compared to about .0002 per cent for calcium oxide. Calcium chloride will not reduce acidity.

Soda Lime is a mixture of sodium hydroxide, NaOH , and calcium oxide. Its drying properties are much like those of calcium oxide, but it has less tendency to disintegrate and reacts more rapidly with halogenated hydrocarbons, as is shown by Table VI. Sodium hydroxide is water soluble.

Soda lime has been used only with methyl chloride, and then mainly to combat copper "plating." It and other strongly alkaline materials should not be used with refrigerants unless the rate of reaction is known—an explosion may result from a too rapid reaction.

The remarks on soda lime apply to *caustic soda* (sodium hydroxide), NaOH, and *caustic potash*. These have an additional disadvantage in being completely water soluble and should not be used.

Barium Oxide is similar to calcium oxide, but is too reactive with water and has been known to cause explosions. The explosions may result from heat of reaction with water, possibly accompanied by reaction with the refrigerant.

Magnesium Perchlorate, *Barium Perchlorate* or any other perchlorate should not be used in refrigerating systems because of the possibility of serious explosions when con-

The halogenated hydrocarbon refrigerants generally employ a dryer to best advantage in the liquid line where it can remove water before it gets to the "expansion" valve. Pressure drop losses are lower with a dryer installed in the liquid line and the theoretically better efficiency of vapor line drying is balanced to some extent by the lower fluid velocities in the liquid dryer which promote higher efficiency. In any event, satisfactorily low moisture contents can be obtained by drying the liquid halogenated hydrocarbons.

Sulfur dioxide presents special problems. In the first place, liquid phase drying is inefficient (Table V) although water can be removed quite well from the vapor by installation of a dryer in the suction line. However, as liquid sulfur dioxide containing water boils, the moisture tends to remain behind as the sulfur dioxide vapors pass off. Therefore, especially with flooded evaporators, it takes a comparatively long time for

TABLE VI—REACTION RATES—METHYL CHLORIDE AND ALKALINE DRYING AGENTS (%)

Contents of Tubes	Temp.° F.	Storage Time Hours	Chlorides in Drying Agents		MeCl Decomposition
			Before	After	% Per Hour
25 cc MeCl plus 10 gm CaO	77°	24 hours	0.017%	0.088%	0.006%
25 cc MeCl plus 10 gm CaO	122°	24 hours	0.017	0.045	0.007
25 cc MeCl plus 10 gm Soda Lime.	77°	72 hours	0.151	2.73	0.021
25 cc MeCl 5 gm potassium hydroxide	122°	24 hours	0.12	2.13	0.024
25 cc MeCl 5 gm sodium hydroxide	77°	64 hours	0.14	0.83	0.008
25 cc MeCl 5 gm sodium hydroxide	122°	24 hours	0.14	2.61	0.030

tacted with organic materials such as lubricating oil or methyl chloride.

It may be seen that Activated Alumina, Drierite, Silica Gel, and calcium oxide may be used with methyl chloride and methylene chloride. The manufacturer of the Freons recommends Activated Alumina, Silica Gel, and Drierite.⁸ Temporary use of Calcium Oxide with "Freon-12" has been reported.⁴

Phosphorous Pentoxide has excellent drying qualities but it dissolves in water to form phosphoric acid. It is ordinarily supplied as a fine, light powder which is difficult to handle.

the water to leave the evaporator and reach the dryer, and in the meantime, the equipment may have been corroded to an appreciable extent.

Halogenated hydrocarbon refrigerants, having a very low solubility for water, tend to allow early escape of water even from flooded evaporators by the process of two-phase or "steam" distillation as well as by virtue of the known principal that a small amount of a dissolved material of low solubility exerts an abnormally high vapor pressure. Still another difficulty with sulfur dioxide is that, because of the lack of warning of the presence of moisture by a freeze-up, serious damage may take place before the presence of moisture is suspected. However, temporary installation of a large diameter suction line dryer charged with large particles of drying agent is useful as long as a machine is running, and may well be used for insurance after charging or overhauling a machine. According to V. E. Hall⁵, heat-

⁴ G. C. Licence, Air Conditioning & Refrig. News, March 23, 1938, page 20.

⁵ V. E. Hall, Refrigeration Service Engineer 6, No. 12, 13-17 (1938).

⁶ K. M. Newcum, Electric Refrigeration News, 8/26/36, Page 17; Air Conditioning and Refrigeration News, 12/20/33.

⁷ R. & H. Chem. Dept., E. I. du Pont de Nemours & Co., Unpublished Reports.

⁸ R. J. Thompson, Kinetic Chemicals, Inc., Technical Paper No. 11.

ing the evaporator after pumping down the low side will help speed the drying if the vacuum pumping on the evaporator is continued so as to draw the water vapor to the dryer.

Technique with Dryers

A vapor line dryer of the conventional type should be installed upright with the exhaust end at the bottom to allow for oil drainage. Some designs can be installed horizontally. In the case of a liquid line dryer, the exhaust end should best be uppermost to keep the tube filled with liquid and thus insure maximum contact time.

The quantity of drying agent that should be used is, of course, dependent upon the moisture content of the system and therefore difficult to judge. V. E. Hall's suggestion of one-tenth pound of dryer per pound of refrigerant as an average for a service dryer and 0.05 pound of dryer per pound of refrigerant for a precautionary service dryer installed on a supposedly dry system seems reasonable. Removal of moisture from a very wet system should not be attempted with a dryer. New refrigerant and oil charges are needed, and the system should be dried by a vacuum or flushing treatment before these are added.

The size of drying tube selected for a given job should generally be in accordance with the manufacturer's recommendation since this will vary with machine tonnage, refrigerant being treated, size of drying agent particles and details of design of the drying tube such as filter area and type of filter.

Indicating types of Drierite and Activated Alumina have been used to warn of spent drying agent. These are impregnated with cobalt chloride which is blue when dry, pink when moist. As cobalt chloride is water soluble there may be some danger of corrosion and therefore these indicating types are not recommended for refrigerating systems.

Long continued or repeated use of a dryer may be necessary if moisture is introduced by a suction leak or is masked by oil.

When a dryer is installed in the liquid line after refrigeration stops as a result of a freeze-up, the system may be allowed to stand until the ice melts, or gentle heat may be applied to speed the melting. Then if the refrigerant flow is throttled down sufficiently, the dryer can remove water efficiently so that there is less chance of repeated freeze-ups before the system is dry. A system warm throughout speeds the dry-

ing by hastening the escape of water from the evaporator and preventing continued freeze-ups.⁶

Anti-freezes and Liquid "Drying" Agents

Separation of water as ice in a refrigerating system is sometimes prevented by the addition of an anti-freeze such as methyl alcohol. Such use of the latter in methyl chloride systems is claimed by U. S. Patent 1,570,080 issued to Roscoe R. Stitt. Anti-freezes of this nature do not remove water or change it chemically to harmless compounds, but allow it to remain in the system where it may exert its other bad effects such as corrosion. Therefore, if an anti-freeze is used to open up a frozen system or to keep it open, it should always be followed by a chemical dryer to remove water. The anti-freeze itself should be non-corrosive and otherwise harmless. Recent research by the du Pont Laboratories⁷ has shown that while pure methyl chloride and pure methyl alcohol are themselves essentially non-corrosive to common engineering metals, a mixture of the two ultimately becomes somewhat corrosive to steel. The same is probably true with other halogenated hydrocarbon refrigerants.

Liquid "drying" agents are quite different in principle from the above mentioned anti-freezes, and have been suggested as a cure for wet systems because of their reaction with water to form harmless or relatively harmless reaction products. One such material, for which the manufacturer reports good results in test and actual practice, is an alkaline preparation intended for use with hydrocarbon and halogenated hydrocarbon refrigerants. Being an alcoholic solution of various sodium organic compounds, it eventually forms sodium chloride and alcohols when used in wet halogenated hydrocarbon systems. Any liquid "drying" agent, before being unqualifiedly accepted, should have shown through tests and field experience that it and its reaction products are essentially harmless to a refrigerating system.

We can summarize all of the foregoing by saying that moisture is definitely harmful in refrigerating systems, and all reasonable precautions should be taken to keep it out in the first place. If moisture gets into a system before refrigerant and oil are charged, it may be removed by a vacuum or dry gas flushing method, which may be followed by a chemical dryer after the system is charged. If moisture is contained in small quantities in a system charged with a halogenated hy-

drocarbon refrigerant, it may be removed by a chemical dryer such as Activated Alumina, Drierite, or Silica Gel in the liquid line. In sulfur dioxide systems these dryers may be used in the suction line but results are less sure. If moisture is present in a charged

system in considerable quantity, the system must be discharged, dried, recharged, and then, for added insurance, treated with a chemical dryer.

(Concluded)

Salesmanship in Service Work

By E. P. SORENSEN *

RECENTLY, it was my good fortune to have the opportunity of attending one of the regular meetings of the Chicago Refrigeration Supply Jobbers' Association. All of the members in attendance were wholesale dealers in refrigeration parts. Consequently, their goods and wares are sold almost entirely to servicemen for subsequent installation. For this reason, the problems of the service and installation man are of vital interest to the members of the Jobbers' Association so that servicing problems are frequently the subject of discussion at association meetings.

On this particular occasion a very important subject was discussed at some length. It concerned the serviceman who unwittingly makes statements to his customers which are not in the best interests of the servicing branch of the refrigeration industry. This suggested the fact that servicemen frequently express their lack of interest and ability in the art of salesmanship.

Nevertheless, these same men are "selling" every working day. Unconsciously, they are soliciting customers for their services; they are convincing customers by sales methods that certain parts should be replaced or that certain complete overhaul jobs should be performed, and in a score of ways are faced with the same problems which are encountered by men whose duties are strictly of a sales nature.

However, it frequently happens that the selling end of servicing is not handled in the very best interests of the serviceman. So frequently, we hear of servicemen bewailing their sad experiences with certain makes of machines owned by their customers. In so

doing, the serviceman is driving that customer to thoughts of trading in his equipment for new machines and in that way is actually narrowing down the potential market for service work in that community. Equipment that will give much additional useful service after a reasonable amount of repair work, is frequently discarded or traded in when proper salesmanship on the part of the serviceman might have brought forth an order for that work and continued use of the equipment by a happy and satisfied user.

There is an old Spanish Proverb which says, "You will attract more flies with honey than with vinegar." Certainly, reminding the prospect of his poor buy in the past opens an old wound and nothing is accomplished other than the building up of a natural resistance to sales argument.

Let us consider the following dialogue:
Serviceman: "So you have one of those old crates. Those Freeze Fast refrigerators never were any good. I find that they are always stuck up and I don't think the Freeze Fast Company made them right in the first place. That refrigerator sure is a lemon if there ever was one."

Customer: "Oh, is that right. Well, with the trouble I am having and knowing that the machines were not good in the first place, I think I will trade this in on one of those new Stay-Colds. Their salesman was around here offering me a pretty good trade-in allowance the other day but I had an idea that you could fix up this machine of mine to run like it used to, at low cost."

Now consider the following dialogue which might have taken place.

*President—Utilities Engineering Institute, Chicago, Ill.

Serviceman: "Oh, so you have a Freeze-Fast. Well according to my experience they sure have given a lot of wonderful service all these years. I suppose you have been well satisfied with this machine. I see according to our records that you haven't had a service call in for quite a while and that certainly speaks well for any refrigerator. In fact, it is really remarkable how they run day after day without any attention at all. I'll carefully diagnose the trouble and I'm sure I'll be able to fix it up in perfect running order so you can continue to receive the same fine service you are used to."

Customer: "That will be fine. When I bought this machine the salesman convinced me I was buying the best available at the time and I think he was right. I have been thoroughly satisfied and hope that you will be able to fix it up now without too much expense."

Serviceman: "You may rest assured, Mr. Customer, that I am going to keep the cost down just as much as possible, and I'm sure I can take care of this trouble with little loss of time for you and not any great amount of expense."

Reaction of Customer

You will recognize in the above comparison that in the first case the customer has been unsold and has been convinced that his old equipment is of no value. Consequently the servicing end of the refrigeration business lost a customer.

In the second case, the customer has been made to have an appreciation for mechanical refrigeration that is greater than ever. He is pleased to know that he made a wise selection in the purchase of his equipment and the serviceman has "eased the pain," so to speak, in regard to the cost of the needed repairs.

Thus, you will recognize that diplomatic handling of the customer is of vital importance to the serviceman. That is salesmanship in every sense of the word and the serviceman who applies the best salesmanship to his work is going to profit to the greatest degree.

There are various other ways in which a lack of diplomacy on the part of the serviceman is detrimental to his own best interests. When the serviceman knocks the work done by the previous service or installation man, he is causing the customer to lose confidence in all installation and service

men. Whenever possible, make your customer feel that he has good equipment, that he has exercised good judgment in selecting the equipment and the people with whom he has dealt. Help to maintain his confidence in the ability and integrity of the personnel of your industry and in the equipment which it produces and maintains.

Do Not Criticize

We frequently notice that servicemen make disparaging remarks about the manufacturer of the equipment he happens to be servicing. He criticizes the manufacturer for possible economies in production and in the design of its equipment. All of his remarks are actually hurting his own best interests. It is, of course, true that hindsight is better than foresight. At the time the equipment was manufactured, the principles incorporated into its manufacture were accepted and the equipment was produced with proper regard to manufacturing problems, accessibility for repairs, competitive marketing conditions and scores of other factors that must, of necessity, influence the design and construction of all manufactured goods.

Of course, if the equipment is worn out because it has exceeded its period of usefulness, the customer should be properly advised in that regard. However, here again it is necessary to be very diplomatic in giving credit to the machine for the splendid period of service it has given. In that way your customer will learn to have confidence in you. He will be assured that you will not endeavor to sell him repair service on worn out equipment. He will respect your recommendations and you will develop a customer of long standing who will be a genuine asset to you and your business.

M. D. Spellman
Idaho

Received my first copy of your magazine and wish to say it is better than I expected. Will say that you have the best type of equipment manufacturers advertising in your numbers.

Kermit M. Jones
Oregon

Enclosed please find \$2.00 for THE REFRIGERATION SERVICE ENGINEER. Have only one objection to your magazine—it isn't printed often enough.



SERVICE KINKS

Tools and Equipment You Can Build



Under this heading will appear simplified or short cut methods of performing individual service operations; also details of how you can build special tools and equipment for your own use. Readers are invited to submit information for publication under this head.

INTRODUCING A NEW DEPARTMENT

In introducing this department to our readers, it is our hope that the exchange of ideas expressed will be found of considerable value in improving and speeding up service methods. Many men throughout the country have devised methods of testing and servicing, which, through their continued use, have proven to be of value. A spirit of cooperation has prompted them to pass on these ideas to others through the medium of this journal. The contribution which follows is the first prize-winner of the recent service kink contest conducted by this paper. Other prize-winning entries will appear in succeeding issues.—Editor.

Building a Charging and Testing Board

By R. E. MEEKER



R. E. MEEKER

AS the trend in domestic refrigeration is turning to hermetically-sealed units, it is desirable that small shops have some means of testing and charging, thereby eliminating as much questionable work as possible.

The board, illustrated in Figure 1, can be built for less than sixty dollars and provides a means of making all the necessary tests on hermetic or open type units.

The refrigerant measuring drum is made of four inch tubing, eighteen inches long. Two five inch discs of 3/16 inch sheet iron were used to cap the ends by means of brazing. A one inch tube, three inches long, was capped at one end and inserted one inch in the bottom to hold the electric heater. The heater used is an electric soldering iron element. Holes were drilled in the plates for the sight glass connections and refrigerant lines. Two half inch bolts were brazed to

the back of the tank to support the tank as in Figure 2.

The sight glass was brought out at the side so that the double strength plate glass three inches wide and twenty-four inches long could be placed in front of it as a matter of precaution so if the sight glass were ever broken it would have a tendency to protect the worker's eyes. Either the plate glass or the board back of the sight glass can be graduated so as to read in pounds of refrigerant. Every one-and-seventeen-thirty-seconds inches equals a pound. Be sure and stay an inch from the bottom to clear the heater so as not to be off scale. This heater eliminates the use of a torch and also is a help when charging gas on the low side as the drum does not frost up. Be careful not to leave the heater on so that excessive pressure will be built up and always have your gauge open so that the pressure may be observed. This tank should be tested for about three hundred pounds pressure using air or C.O.₂ and testing under water before mounting.

The barometer and mercury column were

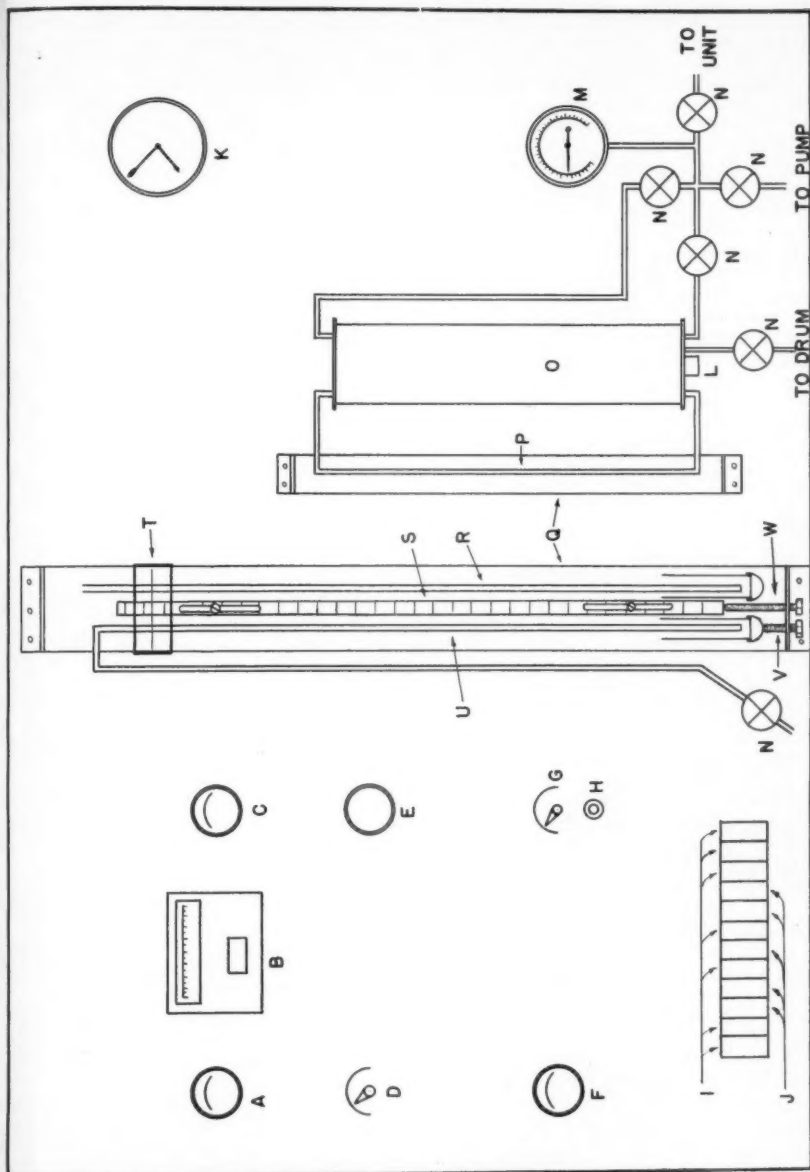


FIG. 1.—CHARGING AND TESTING BOARD FOR HERMETICALLY-SEALED UNITS

A—Voltmeter. B—Watt Meter. C—Ammeter. D—Rheostat. E—Light. F—Milli-Ammeter. G—Capacitor Selector. H—Push Button. I—Snap Switches. J—Convenience Outlets. K—Electric Clock. L—One-inch Tube for Heater Element. M—Compound Gauge. N—Packless Hand Wheel Valves. O—Refrigerant Measuring Tank. P—Sight Gauge for Refrigerant, Graduated in Pounds. Q— $\frac{1}{2}$ -inch Plate Glass Shields. R—Barometer. S—Adjustable Scale for Reading Barometer and Mercury Gauge. T—Slide with Hair Line. U—Mercury Gauge. V—Adjusting Screw for Mercury Gauge. W—Adjusting Screw for Scale.

made of 5/16 inch glass tubing, 38 inches long and has two adjustments, one for the mercury column level and the other for the graduated scale as shown in Figure 1. The barometer was made by slipping a hose on one of the glass tubes and inserting in a test tube three quarters full of mercury. By tilting this tube so that the vacuum pump will pull the mercury within about a half inch of the top, using a prestolite torch the tubing can be stretched and sealed off. When the tube is standing perpendicular the mercury will fall back somewhere in the vicinity of twenty-nine inches. After the barometer is mounted in place, you can call your weather man and check it for ac-

Materials Used

- 1—3/4-inch plywood board for panel, 4 ft. by 6 ft.
- 2—7/16-inch iron discs, 5 inches in diameter for charging tank.
- 1—4-inch compound wall gauge to be used at (M).
- 1—One-inch copper tube, 3 inches long for heater in charging tank.
- 1—water gauge, 18 inches long for gauge on tank.
- 1—electric soldering iron element for heater in tank.
- 1—300-watt electric iron element used as resistance.
- 6—Superior Packless Valves indicated as (N).
- 1—double strength plate glass, 3 inches wide, 24 inches long.
- 2—heavy 5/16-inch glass tubes, 38 inches long.
- 1—clearly marked yard stick.
- 2—test tubes, 3/4 inches in diameter, 6 inches long.
- 1—double strength plate glass, 5 inches wide, 42 inches long.
- 1—kilowatt hour meter.
- 1—volt meter.
- 1—watt meter.
- 1—clock hair spring for watt meter.
- 1—0 to 1 millimeter.
- 1—1000-volt D. C. power pack.
- 7—snap switches.
- 4—ordinary outlets.
- 1—3-wire outlet.
- 1—60 mfd. starting capacitor.
- 1—80 mfd. starting capacitor.
- 1—100 mfd. starting capacitor.
- 1—110 mfd. starting capacitor.
- 1—120 mfd. starting capacitor.
- 1—push button.
- 1—rheostat or two toaster elements equivalent to 600 watts.
- 1—neon lamp or ordinary lamp.
- 1—electric clock.

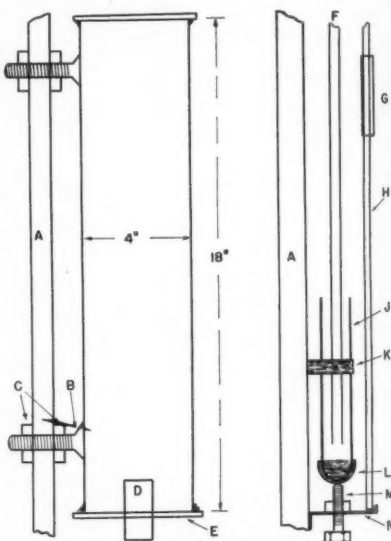
Miscellaneous bolts, screws, wires, fittings, etc.

curacy and make adjustments of your scale accordingly. The mercury column is placed beside it and the copper tubing is coupled to the mercury column with rubber hose and clamps.

The graduated scale between the barometer and the mercury column should be made to slide freely in its mounting so that it is easily adjusted by means of the adjusting screw provided. It may be used to measure both the barometer and the mercury gauge. Measurements are always taken from the top level of the mercury in the outer tube to the top level in the inner tube or in other words a measurement of the difference of the two levels is made.

Advantages of Mercury Column

The mercury column has many advantages over an ordinary vacuum gauge. First, the inches of vacuum are spread over a greater scale length making closer readings possible, and second, it is always accurate when used in coordination with the barometer; that is, as the barometer changes from day to day, so will the compressor readings. If the barometer is standing at 28 1/2 inches and the compressor will pull 28 1/4 it is as good as when the barometer is



FIGS. 2 and 3.—DETAILS OF THE MEASURING TANK AND MERCURY GAUGE

A—Panel Board. B—1/2-inch Bolt Brazed to Tank. C—1/2-inch Nuts. D—One-inch Tube for Heater. E—Plates Welded on Ends. F—5/16-inch Glass Tube for Mercury Gauge. G—Slide with Hair Line. H—3/4-inch Plate Glass Shield. J—Glass Test Tube. K—Guide for Tube to Slide in. L—Metal Cup to Fit Test Tube. M—Adjusting Screw and Nut. N—1/16-inch Sheet Metal.

standing at 29 1/2 inches and the compressor will pull 29 1/4. After testing a few compressors you can determine what tolerances to allow.

The watt meter was built from an ordinary kilowatt hour meter taking off the recording dials and leaving the armature free to turn with as little friction as possible. The center end of a hair spring from a clock was fastened to the shaft. The outer end was fastened to a number eighteen copper wire which is in turn fastened to the meter body. The hand is also fastened to the shaft

as in Figure 4. You should have about a six hundred watt load to try out this meter as several attempts will have to be made before the spring is the right tension. The dial will have to be made curved so that the hand will clear. This meter is very reliable and even when accidentally shorted doesn't seem to get out of calibration. Of course it may be just as easy in your locality to secure a watt meter and thus avoid this part of the work.

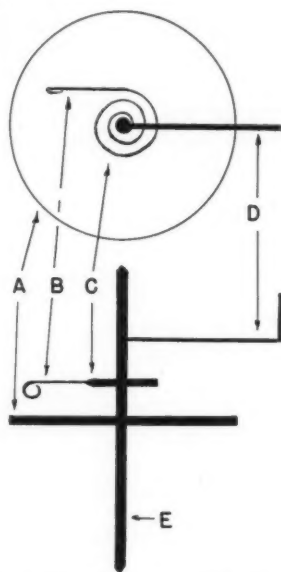


FIG. 4.—DETAILS OF CHANGES IN WATT-HOUR METER

A—Rotor. B—Wire Fastened to Spring and Base. C—Spring Fastened to Shaft. D—Indicating Hand Fastened to Shaft. E—Shaft.

The continuity tester is just a neon lamp used for tracing wires and such.

The rheostat was made with the two toaster elements fastened together and tapped at one hundred watt intervals. By using this with the watt meter you can tell at what wattage the protecting device will kick off. It is advisable to keep the kick-off point as low as possible as it is much easier to reset this than to rebuild a burned out unit.

The capacitor selector was built from 60, 80, 100, 110, and 120 mfd. starting capacitors. This was arranged with contact points so as to select a capacitor that seemed to fit

the purpose best. The push button is used to put the capacitor in circuit for starting.

The milliammeter is used to tell the condition of a winding. The glass was taken out of the milliammeter and the scale was painted from 0 to .125, green for good, from .125 to .25, yellow for fair, from .25 to 1, red for bad, this was merely done to convince an inquisitive customer why it needed a new stator even though the old one still runs. The one megohm resistance was put in series to protect the meter. However, if the old winding checks satisfactorily but the insulation feels deteriorated you will have to form your own opinion as to whether to use it or not. As you have no amperage to burn out syromics a switch was put in to bypass this meter, thereby giving more amperage to test for near shorts in windings or syromics that wouldn't show up at 110 volts.

The power pack was built as in Figure 6, having a bypass switch for 110 volts for AC and DC as AC has better arcing qualities.

The entire board was wired as in Figure 5.

Using the Test Board

As the manufacturer does not give much data on hermetic units it is desirable to keep charts and graphs, plotting the wattage against various vacuums and head pressures, setting up a standard to work by on future units of the same model and make.

For example, a G.E. D.R.2 unit would look something like this on assembling, using the milliammeter, checking winding to ground including syromics with one-tenth of one milliampere. The barometer was standing at 28 $\frac{3}{4}$ inches for these tests.

Pumping free air	150 watts
Pumping 28 $\frac{1}{2}$ inch vacuum.....	125 watts
Pumping free air against 100 pounds	225 watts
Pumping 28 $\frac{1}{4}$ inch vacuum against 100 pounds	175 watts
Pumping free air against 200 pounds	325 watts
Pumping 28 inch vacuum against 200 pounds	250 watts
Pumping free air against 300 pounds	400 watts
Pumping 27 $\frac{1}{2}$ inch vacuum against 300 pounds	300 watts

Assuming the above tests were satisfactory the unit is then baked out, and again brought to the charging and test board.

Using the electric heater in the refrigerant tank, pressure is run up to one hun-

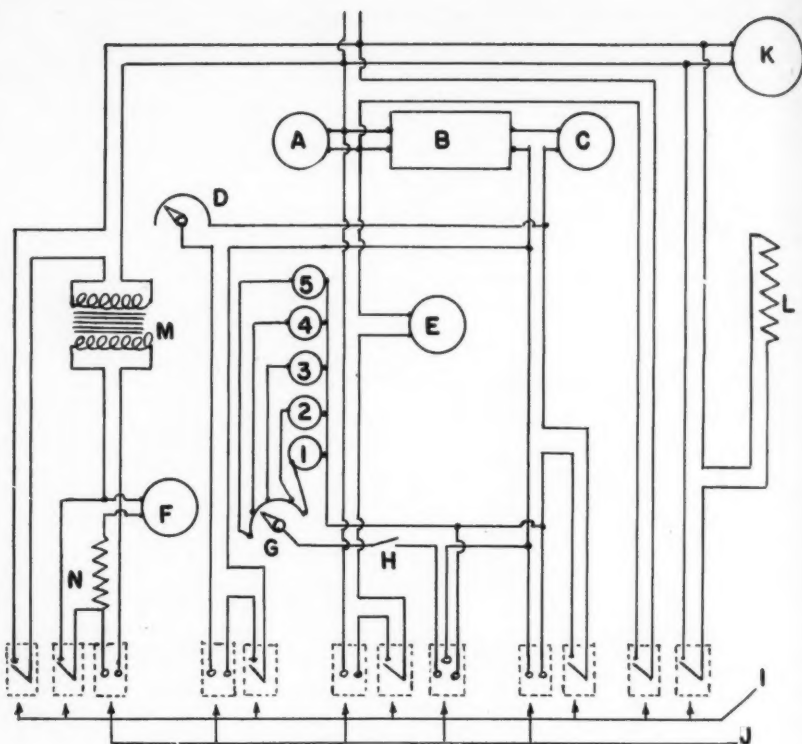


FIG. 5.—WIRING DIAGRAM FOR TEST BOARD

A—Voltmeter. B—Watt Meter. C—Ammeter. D—Rheostat. E—Test Light. F—Milli-Ammeter. G—Capacitor Selector. H—Push Button Switch. I—Snap Switches. J—Convenience Outlets. K—Electric Clock. L—Heater for Charging Tank. M—1000-volt d.c. Power Pack. N—Resistance 1, 2, 3, 4 and 5 are Capacitors of Different Ratings. Reading left to right, the Outlets (J) are: (1) Stator Meter and 950-volts; (2) Resistance for Cut-off; (3) Test Plug; (4) Plug Using Capacitor for Starting; (5) Plug Connecting Watt Meter and Ammeter.

dred fifty pounds, with which the final check for leaks is made before charging. This gas being pumped out, five and three-quarters pounds of refrigerant added, evaporator at zero degrees, head pressure sixty pounds, unit draws one hundred seventy-five watts. Using the rheostat to set the overload protector at three hundred watts this unit should never burn up due to faulty starting. Remember this is only an example and the writer does not intend the data to be used as specifications.

The watt meter can also be used to tell if bearings are tight, stator not centered properly, rotor needs soldering, checking capacitors, checking a new winding and check-

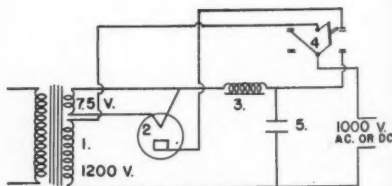


FIG. 6.—DETAILS OF THE POWER PACK

- 1—Power Transformer 1200 v. center tapped 7.5 v. and 110 v. primary.
- 2—81 Tube.
- 3—Filter Choke 10 henry at 200 mills.
- 4—Double Pole double Throw Switch.
- 5—2000 v. 4 mfd. Paper Condenser.

Be sure not to use meter with a.c.

ing a rewound stator for current consumption. With the aid of the refrigerant measuring drum you can measure out refrigerant to charge units in pounds of liquid or fill service drums, et cetera. Using the electric heater you have plenty of pressure to check for leaks in evaporators, seals, and other parts.

The mercury column is an accurate vacuum gauge when used with the barometer. This is particularly desirable in rotary compressors such as Grunows, as these must pull within one-half to one-quarter of an inch of the barometer to work satisfactorily.

The rheostat is used to check various elec-

tric kick-offs. Hooking this to the running winding connections of various starting devices you can set cutout to kick off at any desired wattage or amperage.

The capacitor selector is used to select the right capacitor for different motors and units.

The milliammeter is used to tell the condition of a winding due to acidity, moisture, faulty insulation or to check new windings and syromics. By bypassing the meter you have a thousand volts to test to ground. This will show any weak spots in the insulation, windings or syromics due to the arc created. Any weak spots found can be insulated so as to give no further trouble.

The Question Box

Readers are invited to send their problems pertaining to the servicing of household refrigerators and small commercial refrigerating equipment as well as oil burners to "The Question Box."

HERMETIC UNITS

QUESTION 299. The usual symptom of an overcharge of refrigerant in a refrigerator is the falling of the high side pressure when the compressor has stopped, after it has been running for a while, and registering the correct pressure while running. In this case, I am thinking about a Norge single-vane rotary compressor, having a low side float flooded evaporator, with a check valve in the suction line.

Here the low side pressure begins to rise as soon as the compressor ceases to run, and the head pressure begins to drop. This also happens when there is a shortage of refrigerant.

How can you tell when you have the correct charge? What are the symptoms? Is the condenser too warm, etc?

Another thing I would like to know is—when using the purging and charging valves and adapters on the high sides of the comparatively new hermetically-sealed refrigerators, how do you know you have the normal high side pressure and correct charge of refrigerant when you haven't the low side pressure readings; that is, you cannot make use of your compound gauge because there is no other opening for gauges except the

plug on the high side on which you use the pressure gauge?

Then, again, do you take the room temperature or the compartment temperature where the unit is, when consulting the charts for the correct pressures for the refrigerator?

ANSWER: While gauges as a means of determining the troubles on refrigerators permit a more thorough examination, they are not, in my estimation, necessary to determine the common troubles found.

If all the symptoms are observed, there is little doubt the trouble may be located without the aid of gauges. The symptoms, of course, will be the same on all machines, regardless of whether they are hermetically-sealed, or of the open type. The symptoms change only with the type of system, such as the type of liquid control or motor control used.

The symptoms of an overcharge on a high-side float, or capillary tube type of system, are frosting of the return line, or if the system is extremely overcharged, the return line and compressor crankcase may sweat, and continuous running will result. The suction pressure will be high, and the head pressure will be normal, or high. Refrigeration will be poor.

On low-side floats and expansion valves,

You Don't GAMBLE

with Performance Thanks to **FEDDERS ACCURATE CONSERVATION RATINGS**

When you select Coils, Unit Coolers, Evaporators and Valves,—you usually base your choice on CATALOG RATINGS.

Initial cost, operating cost and service cost depend on accurate ratings. They safeguard your profits.

All Fedders ratings are based on ACTUAL SQUARE FEET OF SUR-

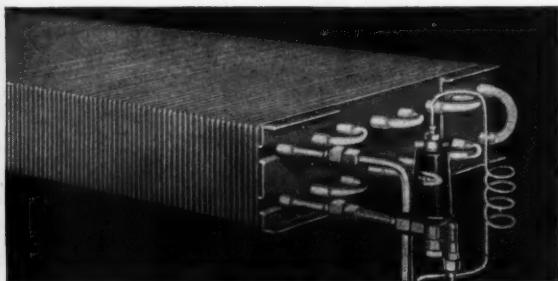
FACE, even the holded fr deducted. Heat trans tests accordance with standa ngin practise assure accurac

Fedders ratings are cepts used as dependable standrds industry. They assuatis performance with minim op cost.

FEDDERS MANUFACTURING CO., INC.

ATLANTA - BOSTON - CHICAGO - CINCINNATI - DALLAS - DETROIT - LOS ANGELES - NEW YORK - PHOENIX - PITTSBURGH - ST. LOUIS - WASHINGTON

Representative Suppliers Everywhere



COPPER TUBE AND COPPER FIN COILS



WALL UNIT COOLERS



HOUSEHOLD
EVAPORATORS

ARE YOU GETTING YOUR COPY OF THE FEDDERS CATALOG?

AMBLE

o SENSITIVE

the hole d fins are
Heat transmits in ac-
h standa engineering
re accurac

atings are pted and
ndable stands of the
hey assu satisfactory
with mini operating

CO., BUFFALO

ELES - NEW YORK - PHILADELPHIA

ere



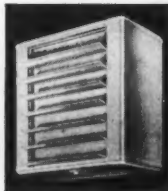
HOUSEHOLD
VAPORATORS



THERMOSTATIC EXPANSION VALVES



CONSTANT
PRESSURE
VALVE



SINGLE AND TWIN
UNIT COOLERS

FEDD NEWS ?

the symptoms will be high head pressure, excessive running, hot condenser; the suction pressure will be normal. These latter conditions, however, may also be due to air in the system, to a dirty condenser, high suction pressure, or possibly to an undersized condenser. It would be necessary to check these items before coming to any conclusion.

The symptoms of an undercharge in a system employing a high-side float, or capillary tube, and controlled by a thermostat, will be no frosting, or only partly frosting evaporator, head pressure and suction pressure low, liquid line warm or hot, excessive running, hissing noise at liquid control.

For pressure-controlled high-side float systems, the symptoms would be the same as the above, except that the machine would run in short cycles. On a low-side float, or expansion valve system, employing a thermostat to control the motor, the symptoms would be poor refrigeration, or none at all, continuous running, low head pressure, high suction pressure, hissing noise at the liquid control. The liquid line would be hot.

Again, I repeat, that if all these symptoms are observed, it is possible to determine these conditions with or without pressure gauges.

In determining what is known as the ambient temperature, or the temperature surrounding the machine, it is better, I believe, to use the compartment temperature, or if possible, it would be better even to use the condenser temperature. In either case, the head pressure will run approximately 20 or 25 lbs. per square inch higher than the pressure indicated for the given temperature on the temperature relation chart.

REFRIGERANT DRIERS

QUESTION 300. We have been very interested in your March article on "Refrigerant Driers," and would you like to know if you can give us information on one further aspect.

As far as we know, no data has yet been published in New Zealand giving the proper relation between dehydrant and refrigerant. Could you supply us with exact information as to the cubic inches of dehydrant which should be used per pound of refrigerant?

For our own purposes, we would require such data only as regards Activated Alumina, in conjunction with methyl chloride, sulphur dioxide and Freon, but a comprehensive tabulation with other refrigerants and driers would make interesting comparison.

We will be grateful if you can give us any

help in this manner, as the proper specification would be of great value.

ANSWER: Since your question referred to the article on "Refrigerant Driers," which was written by Dr. Walker of the Ansul Chemical Company, we forwarded your question on to him to answer, and his reply follows:

Dr. Walker's Reply

"The tabulation requested must be based on experimental data which are lacking, and moreover, have no practical bearing on the problem of drying a refrigerant in a machine since the quantity of moisture is unknown. We must remember that the capacity of a drier, to absorb a definite quantity of moisture from an oil-refrigerant mixture, is totally different from its rated capacity. The latter is based upon the quantity of moisture absorbed from some gas-containing moisture. The same holds true relative to the ability of a drier to reduce the moisture content of the material being dried, to a sufficiently low level. In other words, removing moisture from a gas is different from absorbing it from an oil-refrigerant mixture, even when the refrigerant is in the gaseous state.

"In our experiment, a drier unit of approximately 15 cubic inches capacity and capable of holding when full, about $\frac{1}{2}$ lb. of drier, was used. About 3 lbs. of methyl chloride, or 4.5 lbs. of sulphur dioxide, were dried with approximately $\frac{1}{2}$ lb. of drier. Subsequent work on a sulphur dioxide household unit has revealed satisfactory drying of the refrigerant, where the same ratio of drier to refrigerant held. As predicted in our article, the time required for adequate drying is in excess of 6 hours.

"Regarding the drying of Freon, we refer you to Ansul News Notes, Vol. 2, No. 1, page 8, which contains the following article:

"Freon was not included in the investigation of refrigerant driers since, at the time, it was thought that the same driers could be used for both methyl chloride and Freon. A consideration of the following material shows the probable necessity for a revision of this opinion. Due to the more limited solubility of water in Freon, ice crystals form at higher temperatures than in methyl chloride, the percentages of water being equal. Thus, with .006 per cent water, ice crystals form in Freon at 32°F., and in methyl chloride at -58°F. This water concentration is well below the corrosion limit

for both refrigerants, and, therefore, the single function of a drier must be to reduce the percentage of water below the point at which it will form ice crystals at the temperatures encountered in machines where, at expansion valves, the temperature may run as low as -40°F .

"Any of the driers referred to in Table III, Ansul News Notes, Vol. 1, No. 3, page 5, will be satisfactory for methyl chloride, but due to the very much lower solubility of water in Freon, acceptable drying of this refrigerant is obviously much more difficult. This is a phase of the "drier" problem which requires additional research work."

"From the foregoing, it seems apparent that we must look upon the proposition of the drying of Freon by any of the commonly employed driers as an open question."

MOISTURE IN FREON JOBS

QUESTION 301. I am seeking information regarding the action of moisture in Freon jobs—domestic boxes especially. We have a very large volume of domestic refrigerators using Freon. This includes new refrigerators that are at present in stock and used jobs that are less than a year old in the field.

Every complaint finally analyzed leads to moisture in the system. On jobs that are new, a few drops of methanol solves the problem definitely. On jobs in the field, I find the expansion valve screens are about 80 to 100 per cent stopped up.

I have cut several open and find a very fine green substance, almost like lint, matted tight and enmeshed in the screen.

I have tried everything commonly used as a solvent to clean them, but so far air pressure has been the only fairly successful method. I would appreciate it if you could explain the chemical action of Freon and moisture, and would be further appreciative if you could tell me how I might dissolve this stoppage so as to keep up on my supply of screens instead of having to buy new ones, which, incidentally, are hard to obtain.

ANSWER: We forwarded your question to Kinetic Chemicals, Inc., Wilmington, Dela.—and we have received the following reply from their refrigeration engineer—Mr. R. J. Thompson:

"We have never advised the use of anhydrous methyl or ethyl alcohol in "Freon-12" systems in order to prevent the formation of ice crystals at the regulating valve. It certainly should be considered a much better practice to remove the moisture from

the system and the lubricating oil rather than add any new compounds to the system. In other words, we believe that a cure should be affected by removing the moisture from the system rather than to merely seek relief by adding alcohol to the system.

"We do understand that service men at various times have used anhydrous methyl alcohol in an emergency when evaporators operate below the freezing point of water, and it was stated by them that fairly satisfactory results have been obtained, but the point must not be overlooked that the alcohol does not remove the water, but permits it to remain in the system where the water may cause corrosion or oxidation to metal, and possibly cause emulsification of the lubricating oil.

"It is an indisputable fact that a refrigerating system should be thoroughly dried to prevent all possibilities of corrosion occurring and the freezing out of moisture at the valve. The recommended drying agents to be used for the removal of water from a "Freon-12" charged system are Activated Alumina or calcium sulphate, as pointed out in our Technical Paper No. 11, pages 25 to 27.

"On the second point which you brought up and which concerns the accumulation of dirt at the strainer—the fact must be recognized that "Freon-12" is a very good cleaning agent and will physically remove all factory dirt, scale, oxide or loose particles of cotton and carry this foreign matter to the strainer. "Freon-12" does not have any corrosive action on any materials, but is merely a good cleanser and for that reason strainers or filters should be used on all refrigerating systems in front of the regulating valve. When once these strainers have accumulated the material and been cleaned, there is no possibility of this accumulation reoccurring, as it is assumed that all foreign matter had been collected at the time of the first cleaning of the strainer. This foreign matter can be removed from the strainer only by washing with carbon tetrachloride, gasoline, or any similar type of cleaner."

PLASTER PARIS

IF you are a user of plaster paris as an aid in some of those small repair jobs, and you have trouble with it hardening too fast, try using one-third vinegar and two-thirds water as a mix instead of pure water. Plaster paris will remain like putty for 48 hours when prepared in this manner.

DETROIT LUBRICATOR VISITS THE PACIFIC COAST

SWINGING around most of the country by train, plane, bus and automobile, two representatives of Detroit Lubricator Co. visited California the first part of March.

Meetings were held in San Francisco, Sacramento and Fresno, after which K. B. Thorndike, Detroit's Western Sales Manager, and T. C. McKee of the Engineering Department, arrived in Los Angeles March 10th accompanied by E. J. O'Connell, De-

troit Lubricator representative on the Pacific Coast.

The group headed south that same afternoon for a meeting at San Diego in the evening. The program consisted of a sound film describing Detroit's 1939 lines of expansion valves, the new type 450 controls, and the complete line of solenoid valves. Combined with the meeting was a demonstration by Refrigeration Service, Inc., Los Angeles supply jobber, of their glass evaporator. This apparatus was used to demonstrate a number of points from Mr. McKee's talk which followed the showing of the film.



VIEWS OF THE LOS ANGELES AND SAN DIEGO CHAPTER MEETINGS

1—The group who sat down to dinner at the Los Angeles Chapter meeting of March 13th. 2—Left to right are Mr. Van D. Clothier, chairman of the Los Angeles Section of the A.S.R.E., James Rogers, president of the Los Angeles Chapter of the R.S.E.S., and J. C. Blair, chairman of the Los Angeles Chapter Educational Committee, speaking. 3—The glass evaporator at the San Diego Chapter meeting draws its usual interested crowd. 4—Mr. McKee of Detroit Lubricator Co. demonstrates the thermal valve test at the Los Angeles meeting. 5—Mr. McKee illustrating with the aid of a blackboard for the San Diego meeting of March 10th.

the Pa-
me after-
the eve-
a sound
s of ex-
controls,
valves.
demon-
nc., Los
s evapo-
demon-
McKee's
the film.



to
est-
ju-
ual
os
of

ON



*Virginia
Refrigerants
and
Supplies*

EXTRA DRY ESOTOO

ANHYDROUS LIQUID SULFUR DIOXIDE

Produced under rigid laboratory control to insure unusual purity, dryness, dependability. Available in 5, 10, 35, 70, 100, and 150 lb. cylinders, and in multi-unit tank cars.

V-METH-L

METHYL CHLORIDE

High purity, extremely low acidity, meeting highest specifications of manufacturers of equipment designed for it. Shipped in 3½, 6, 20, 40, 60, 90, 130 lb. cylinders, and in multi-unit tank cars.

METHYLENE CHLORIDE

Refrigeration grade, used in centrifugal compressor systems. Supplied in 1 and 5 gal. cans and in 300 and 550 lb. drums.

DRIERITE

Solid drying agent. Highly efficient, absolutely neutral, easily renewable. More economical than liquid types. Does not contaminate or change characteristics of any refrigerant. Packed in 1 lb. screw-capped metal cans.

**SEE YOUR VIRGINIA JOBBER
VIRGINIA SMELTING CO.
WEST NORFOLK, VA.**



KEROTEST

YOUR GUIDE

AND

GUARANTEE

TO

DEPENDABLE

REFRIGERATION

FITTINGS

● Build goodwill and lasting satisfaction with your customers by installing genuine Kerotest Refrigeration Fittings, nationally distributed through leading jobbers carrying complete stocks for your every service requirement. Your local Kerotest Jobber, listed to the right, will be glad to serve you.

KEROTEST MANUFACTURING CO., PITTSBURGH, PA.

New England Jobbers Sponsor Refrigeration Exhibit

AFTER several months of planning, the New England Jobbers Association held its first refrigeration parts exhibit for the benefit of service engineers in the New England region. The two-day exhibit, held on March 24th and 25th, was a successful affair, being attended by approximately 350 people identified with the trade.

The jobbers who participated in the arrangements for the holding of this two-day exhibit included the following:

- A. E. Borden Co., Boston, Mass.
- Marsden & Wasserman, Inc., Hartford, Conn.
- Melchior, Armstrong, Dessau Co., Boston, Mass.
- National Accessories Corp., Springfield, Mass.
- Parsons Bros., Bridgeport, Conn.
- Carl P. Payson Co., Springfield, Mass.
- Resco, Inc., New Haven, Conn.
- Rhode Island Supply & Engineering Co., Providence, R. I.
- Standard Supply Co., Worcester, Mass.

On the second day, a tube bending contest was conducted by Mr. George E. Frank of the Imperial Brass Mfg. Co., assisted by Messrs. Tom Byrnes and Ray Burk, eastern representatives of the company. Eight contestants participated and the final winners selected were: 1st place, Jack Josephson, Bridgeport, Conn.; 2nd place, W. E. Daisy, Cambridge, Mass.; 3rd place, E. L. Butler, Hollis Center, Maine, who, incidentally, won the additional prize of \$5.00 in cash for coming the longest distance to participate.

Western Massachusetts Receives Charter

On Friday evening a number of the attending guests and manufacturers attended the meeting of the Western Massachusetts Chapter of the R. S. E. S., which received its formal charter, presented by Mr. H. T. McDermott, the national secretary. Mr. Frank J. Kasper, president of the chapter, opened the meeting and introduced the speaker. After the formal presentation, Mr. Kasper accepted the charter on behalf of the members of Western Massachusetts Chapter.

FOR QUICK SERVICE

KERO TEST

REGISTERED

U. S. PAT. OFF.

REFRIGERATION PRODUCTS

Phone your nearest distributor

JOBBER WITH LOCAL STOCKS

Albany, N. Y.	Hoy & Co.	Minneapolis, Minn.	Refrigeration & Industrial Supply Co., Inc.
Allentown, Pa.	General Refrigeration Supply Co.	Minneapolis, Minn.	Vincent Brass & Copper Co., Inc.
Atlanta, Ga.	J. M. Tull Metal & Supply Co., Inc.	Montreal, Quebec, Canada.	Railway & Engineering Specialties, Ltd.
Baltimore, Md.	Clendenin Bros., Inc.	Mt. Vernon, N. Y.	County Seat Plumbing Supply Co.
Binghamton, N. Y.	Melchior, Armstrong, Dessau Co.	Newark, N. J.	T. W. Binder Co.
Boston, Mass.	Syracuse Equipment Corp.	New Haven, Conn.	Resco, Inc.
Bridgeport, Conn.	A. E. Borden Co.	New Orleans, La.	Enoch Supply Co.
Brooklyn, N. Y.	Parsons Bros.	New York, N. Y.	Aetna Supply Co.
Brooklyn, N. Y.	Coleman Electrical Supply Co., Inc.	New York, N. Y.	Melchior, Armstrong, Dessau Co., Inc.
Brooklyn, N. Y.	The Capson Co.	New York, N. Y.	The Harry Alter Co., Inc.
Buffalo, N. Y.	Root, Neal & Co.	Norfolk, Va.	Noland Co., Inc.
Cambridge, Mass.	Melchior, Armstrong, Dessau Co.	Oklahoma City, Okla.	Midake Supply Co.
Charleston, W. Va.	Air Conditioning & Refrigeration Supplies, Inc.	Omaha, Nebraska	United Supply Co.
Charlotte, N. C.	Henry V. Dick Co.	Oshkosh, Wis.	Gustave A. Larson Co.
Chattanooga, Tenn.	Noland Co., Inc.	Pateros, N. J.	White & Shauger, Inc.
Chicago, Ill.	H. W. Blythe Co.	Peoria, Ill.	Wilkins Pipe & Supply Co.
Chicago, Ill.	Fred C. Kramer Co.	Pittsburgh, Pa.	Williams & Co., Inc.
Chicago, Ill.	H. Channon Co.	Philadelphia, Pa.	Melchior, Armstrong, Dessau Co., Inc.
Chicago, Ill.	Automatic Heating & Cooling Supply Co.	Philadelphia, Pa.	Victor Sales Corporation
Chicago, Ill.	The Harry Alter Co., Inc.	Phoenix, Ariz.	Refrigerative Supplies Distributor
Chicago, Ill.	Alro Supply Co.	Portland, Ore.	Bill Heiber, Refrigerative Supply, Inc.
Cincinnati, Ohio.	The Merkel Bros. Co.	Providence, R. I.	Rhode Island Supply & Eng. Co.
Cincinnati, Ohio.	Williams & Co., Inc.	Rochester, N. Y.	Ontario Metal Supply, Inc.
Cleveland, Ohio.	The Harry Alter Co., Inc.	Rochester, N. Y.	Melchior, Armstrong, Dessau Co., Inc.
Cleveland, Ohio.	Williams & Co., Inc.	Rockford, Ill.	Gustave A. Larson Co.
Dallas, Texas	The Electromotive Co.	Sacramento, Calif.	Hinchaw Supply Co.
Davenport, Iowa	Republic Electric Co.	St. Joseph, Mo.	Bristol Supply Co.
Dayton, Ohio.	The W. H. Kiefer Co.	St. Louis, Mo.	The Harry Alter Co., Inc.
Denver, Colo.	Auto Equipment Co.	St. Louis, Mo.	R. E. Thompson Company
Detroit, Mich.	J. M. Ober, Inc.	Salem, Mass.	Standard Supply Co.
Fort Wayne, Ind.	H. J. Schroeder Co.	Salt Lake City, Utah.	Pierless Utah Co.
Greensboro, N. C.	Hasco, Inc.	San Antonio, Texas	Straus-Frank Co.
Harrisburg, Pa.	Melchior, Armstrong, Dessau Co.	San Francisco, Calif.	California Refrigerator Co.
Hartford, Conn.	Marsden & Wasserman, Inc.	Seattle, Wash.	Refrigerative Supply, Inc.
Hempstead, Long Island, N. Y.	Sid Harvey, Inc.	Sioux City, Iowa.	National Refrigeration Service
Honolulu, T. H.	Theo. H. Davies & Co., Ltd.	South Bend, Ind.	F. H. Langenkamp Co.
Houston, Tex.	Standard Brass & Mfg. Co.	Springfield, Ill.	United States Electric Co.
Houston, Tex.	Walter Refrigeration Supply Co.	Springfield, Mass.	C. P. Payson Co.
Indianapolis, Ind.	F. H. Langenkamp Co.	Toledo, Ohio.	The Heat & Power Engineering Co.
Jacksonville, Fla.	Jamita Company	Toronto, Ontario, Canada.	Railway & Engineering Specialties, Ltd.
Kansas City, Mo.	Forlund Pump & Machinery Co.	Tulsa, Okla.	Machine Tool & Supply Co.
Knoxville, Tenn.	Leinart Engineering Co.	Vancouver, B. C., Canada.	Fleck Bros. Ltd.
London, Ont., Canada.	Refrigeration Supplies Co., Ltd.	Washington, D. C.	Refrigeration Supply Co.
Los Angeles, Calif.	A. B. Marsh	Waterloo, Iowa	Winterbottom Supply Co.
Los Angeles, Calif.	Frank Gillett Co.	White Plains, N. Y.	County Seat Plumbing Supply Co., Inc.
Los Angeles, Calif.	Refrigeration Service, Inc.	Wilkes-Barre, Pa.	Radio Service Co.
Louisville, Ky.	Louisville Mill Supply Co., Inc.	Winnipeg, Manitoba, Canada.	Railway & Engineering Specialties, Ltd.
Lubbock, Tex.	R. & R. Paré & Supply Co., Inc.	Worcester, Mass.	Standard Supply Co.
Macon, Ga.	Lowe Electric Co.		
Madison, Wis.	Gustave A. Larson Co.		
Memphis, Tenn.	United Refrigerator Supply Co.		
Miami, Fla.	Roller-Milam, Inc.		
Milwaukee, Wis.	Refrigeration Specialty Co.		
Milwaukee, Wis.	Gustave A. Larson Co.		

FACTORY REPRESENTATIVES

Chicago, Ill.
Dayton, Ohio

Detroit, Mich.
Los Angeles, Calif.

New York, N. Y.
Philadelphia, Pa.

St. Louis, Mo.
San Francisco, Calif.

GENERAL EXPORT REPRESENTATIVES

Melchior, Armstrong, Dessau Co., Inc.
300 Fourth Ave., New York City, N. Y., U. S. A.

REFRIGERATION SERVICE ENGINEERS' SOCIETY

Official Announcements of the activities of the National Society and Local Chapters appear in this department as well as articles pertaining to the educational work of the Society.

CENTRAL ARIZONA CHAPTER RECEIVES ITS CHARTER

IN the presence of a number of visitors and officials of the state of Arizona, Central Arizona Chapter of Phoenix, Arizona, was presented with its charter on March 2nd at a meeting held in the American Legion Hall.

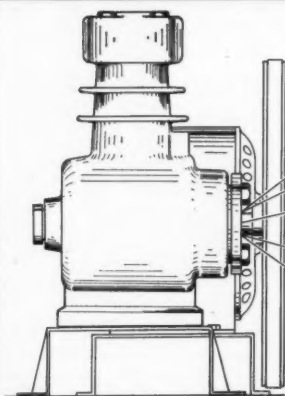
Preceding the charter presentation and the obligation of the members, Mr. H. C. Sparks, State Registrar of Building Contractors, addressed the assembly, after which Mr. C. E. Seikman of the Arizona Corporation Commission was introduced and gave an inspiring address.

In the absence of a national representative of the Society, Mr. Seikman proceeded with the presentation of the charter and the

obligation of the members, and the charter was accepted by Mr. W. Fred Clayton on behalf of this new chapter.

The meeting was an interesting event and during intermission music was furnished by an orchestra, and at the conclusion of the meeting a buffet luncheon was served.

The temporary officers who had served during the formative period of the chapter were re-elected to serve until the end of the present fiscal year, and additional offices filled by vote of the members. The present officers of the chapter are: *President*, W. Fred Clayton; *Vice-President*, C. Tally; *Secretary*, D. H. Coe; *Treasurer*, J. Carl White; *Sergeant-at-arms*, L. L. Palmer; *Directors*, E. F. Worcester, G. W. Lance and J. B. Contreras; *Chairman, Educational Committee*, W. H. Voigts.



**Stop Leaking Shafts
for Once and for All**



ANTI-FRICTION

SYNTRON

**SELF LUBRICATING
SELF CENTERING
SELF SEATING**

SHAFT SEALS

**Now Available for Practi-
cally All Makes of Compressors.**

At New Low PRICES.

Order from your Jobber

SYNTRON CO., THOMAS BLVD., HOMER CITY, PA.



VIEWS OF THE ARIZONA CHAPTER CHARTER PRESENTATION

(1)—Left to right, first row: O. J. Beaver, H. Sizemore, J. B. Contreras, G. W. Lance, John Woods, F. L. Barka, D. H. Coe. Second row: W. H. Voigts, C. M. Tally, C. Hines, L. L. Palmer, E. F. Worcester. Third row, standing: Percy Derting, L. L. Lawson, J. Carl White, W. F. Clayton, Fred Perry.

(2)—Charter being presented (left to right) by C. E. Seikman, Arizona Corporation Commission, to W. Fred Clayton, president, D. H. Coe, secretary, and J. Carl White, treasurer.

(3)—A group view of the members and visitors attending the meeting.

The charter members of the chapter include:

W. C. Banks
F. L. Barka
O. J. Beaver
W. Fred Clayton
D. H. Coe
J. B. Contreras

R. Lugo
L. L. Palmer
W. Rhodes
H. Sizemore
R. J. Stroud
W. H. Voigts

L. Davis
C. Hines
G. W. Lance

H. T. Wang
J. Carl White
E. F. Worcester



"Chieftain" Quality Built Compressors and Condensing Units



are designed to give you many years of quiet, efficient and trouble free service by Engineers who have been serving the refrigeration industry for the last fourteen years.

They have again "scored a hit" with a new "V" type four cylinder compressor which is designed for use with $\frac{1}{2}$ to 1 HP motors. All of the advanced features that have proven so successful in "Chieftain" household and light commercial units are now incorporated in this new four cylinder model.

Mechanical improvements include, force feed lubrication to piston pin and connecting rod bearings, positive alignment of cylinder bores with main bearings by casting cylinders and crankcase in one piece. Adjustable suction shut-off valve, interchangeable parts with single and twin cylinder models. All compressor parts are machined to precision limits on up to date equipment and assembled in glass enclosed rooms where only filtered, dust free air is admitted.

Write for our latest descriptive catalog

TECUMSEH PRODUCTS CO., Refrigeration Division **TECUMSEH, MICH.**

5 EASY STEPS TO PEAK VALVE PERFORMANCE

1

See **YOUR**
JOBBER

2

Ask him for
the New 1939
SPORLAN
CATALOG

3

Select the
SPORLAN
THERMOSTATIC
EXPANSION VALVE
THAT HAS THE
proper charge
for your job

4

Notice that
the Sporlan Valve
you buy is sealed
in the new black
and white Sporlan
container es-
pecially for your
protection.

5

Then
install
the valve on your
job and forget it
...for you can be
confident that
SPORLAN
CONTROLLED PER-
FORMANCE VALVES
will give you
Peak
Performance
on all installations

SPOEHRER-LANGE COMPANY

3725 COMMONWEALTH AVENUE • ST. LOUIS, MO.

Chapter Notes

Under this heading will appear news of the chapter meetings. For names of the officers and dates of regular meeting nights, please refer to the Chapter Directory.

WICHITA CHAPTER

March 3—The meeting was called to order by President F. W. Ryan and the usual routine of business quickly dispensed with.

On the educational program of the evening a lively discussion of new household refrigerating units brought out many interesting details. Following this, a round table discussion of service problems was led by Mr. Ryan.

March 17—The meeting was turned over to Mr. N. E. Jennison of the Penn Electric Switch Co., who gave an interesting explanation of the products of his company, using a film and a large wooden model of the switch to demonstrate his talk. Mr. Jennison answered many questions following his talk to the entire satisfaction of the group.

The program was greatly appreciated by all present.

CAPITAL CITY

February 15—Mr. Ray Stevens of the Detroit Lubricator Co. was scheduled as the speaker of the

evening, but unfortunately was marooned in a snowstorm in the northern part of Maine. Consequently, Mr. Townsend of the same company took his place and was introduced by President R. M. Todd. Mr. Townsend spoke at length on automatic and thermostatic expansion valves, answering many questions and supplying much interesting information.

March 1—112 visitors and members were present at this meeting, with the full complement of officers also present.

The speaker of the evening was Mr. House of the Mueller Brass Co., who was introduced by President Todd. After making complimentary remarks on the fine work of the chapter Mr. House gave a lecture on Mueller products, which included their valves and dehydrators. Mr. Domke of the same company was next introduced and he spoke further on these products. Mr. Sutter also of the Mueller Brass Co., gave some interesting information, too, on their products.

The next speaker of the evening introduced by Mr. Todd was Mr. Lambert of the General Electric Supply Co., who also presented his views and impressions of the R.S.E.S. and stated that in his belief the small amount spent for dues was well worth while.

An entertaining feature of the evening was the Hill Billy Novelty Band, which gave fifteen minutes of musical entertainment.

Refreshments were served at the conclusion of the meeting.

THE JOBBER WHO WORKS FOR ANSUL WORKS FOR YOU



THAT'S HIS BUSINESS, and that's *why* he's *in* business. We're proud of the Ansul Jobber Organization . . . as proud of these men as we are of our Ansul products. And we feel certain these Ansul Jobbers are as proud of their wholehearted, friendly service to you as they are of their business integrity. Let the Ansul Jobber near you begin serving you now!

RS-4-4



ANSUL
SULPHUR
DIOXIDE
•
METHYL
CHLORIDE

ANSUL CHEMICAL COMPANY

**MARINETTE
WISCONSIN**

ST. LOUIS CHAPTER

March 9—The meeting was called to order by Secretary E. A. Plesskott in the absence of President A. H. Huhn.

Mr. E. Gyax introduced Mr. N. E. Jennison of the Penn Electric Switch Co., who gave an illustrated lecture on their various controls, after which he proceeded to point out its features on a large scale model made especially for this purpose.

Secretary Plesskott next introduced Mr. Charles Anderson of the Imperial Brass Mfg. Co., who spoke briefly on a forthcoming tube bending contest to be held by the chapter on April 27th.

TWIN CITIES CHAPTER

March 14—President Wm. Warner dispensed with the business of the evening as quickly as possible and turned the meeting over to the educational chairman, Mr. C. E. Tupper. Mr. Tupper started at the beginning of the national Lecture Course, making a detailed discussion of Lectures 1, 2 and 3. Those present found this program of considerable interest and it was decided to continue in the future with it.

SCRANTON CHAPTER

March 7—After the meeting was called to order by President Wm. Franklin, he turned it over to the chairman of the Educational Committee, Mr. Ted Glou.

Mr. Glou, in turn, introduced the guests of the

evening, Mr. Joseph Askin and Charles Rittling of the Fedders Mfg. Co., who proceeded with an interesting explanation of Fedders products, which was thoroughly enjoyed by the group.

Mr. Glou next introduced the surprise of the evening, their own member, Mr. Ed Avery, who gave a demonstration on the uses of the service analyzer.

Several members of the Wyoming Valley Chapter at Wilkes-Barre were in attendance at this meeting.

TRI-COUNTY CHAPTER

March 3—An Entertainment Committee consisting of Art Wolff, C. Stumpf and O. Starin was appointed by the President.

The meeting was then turned over to Mr. Beasley and Mr. Collins of the Wagner Electric Co., who presented an interesting discussion on Wagner motors and their service.

March 17—A report on the progress of the dance to be held April 22nd was received and tickets for the dance were distributed among the members.

Speakers of the evening, who were introduced by Mr. O. Starin, were Mr. Cox and Mr. Jeffery of the Liquid Carbonic Co. of Chicago. These gentlemen gave an interesting description of Liquid Carbonic soda fountains, which was enjoyed by all.

TOLEDO CHAPTER

March 8—Mr. Maurice Remer, chairman of the Membership Committee, reported that plans were being formulated for an initiation team which

would be the means of making initiations of members more impressive to the new member and at the same time be entertaining to the group in general.

After a short intermission, Mr. Gern of the Girkins Electric Co. gave an instructive talk on the construction and servicing of various types of refrigeration motors. This talk proved very interesting.

AKRON CHAPTER

March 7—A dinner meeting at the Akron Hotel was the feature of this date. In addition to a large turnout from Akron itself, about twenty members from Cleveland Chapter were in attendance.

The speaker who had been arranged for failed to appear, and a general discussion of the problems of the industry continued until a late hour.

Announcement was made of a meeting to be held on April 10th at the Akron Hotel, at which time a Dutch lunch will be served and a representative of the Minneapolis-Honeywell Regulator Co. will be the speaker.

SPRINGFIELD CHAPTER

March 8—The meeting was called to order by President R. M. Potter, who proceeded with the business of the evening which, among other things, included the appointment of a Publicity and Entertainment Committee to act for the balance of the year. The duties of the Publicity Committee are to be the preparation of regular write-ups for newspaper publication.

The balance of the evening was devoted to a discussion of Lecture Course No. 4, which was led by Mr. C. F. Linderman, the educational chairman.

March 22—During the course of the business session of the evening, the Secretary read a letter from Mrs. Lydia Dobbins, expressing her appreciation for the floral offerings sent to the family during her recent bereavement. Mr. R. S. Dobbins, who had passed away a few days previous, was a charter member of the chapter and was president of the United States Electric Co. of Springfield.

After some discussion it was decided that a gold star be placed by the side of Mr. Dobbins' name on the charter of the chapter.

The meeting was then turned over to Mr. C. F. Linderman, educational chairman, who introduced Mr. McDorgel of the Alco Valve Co., who proceeded with an interesting demonstration of their glass evaporator in operation.

MISSISSIPPI VALLEY CHAPTER

February 24—The meeting was turned over to Mr. Glenn H. Swails, who gave an interesting description of the recently installed refrigerating system employed in a 39 ft. by 12 ft. ice cream hardening room. The installation is equipped with blower type coils which keep the temperature to a minimum of 18° below zero. Mr. Swails exhibited blue prints of the layout to illustrate his talk and gave many interesting facts concerning its operation.

Some discussion followed on the practice of some organizations outside of the refrigeration industry who were able to purchase parts at wholesale prices.

KRAMER

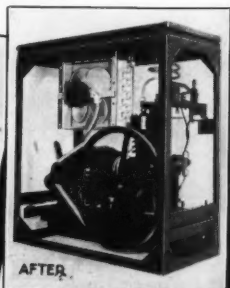
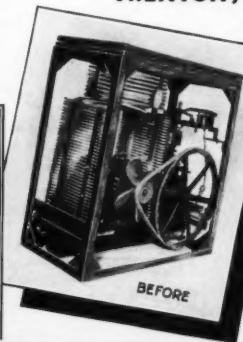
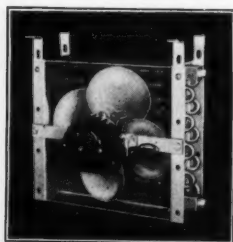
MIDGET UNICON

THE IDEAL CHANGE-OVER FOR MODEL "K" COMPRESSORS

KRAMER

TRENTON AUTO RADIATOR WORKS TRENTON, N. J.

Send for Bulletin 239



Mr. Hartman, who brought up the subject, advised that the matter had been taken up with the manufacturers and that a satisfactory solution was to be hoped for in the near future.

A door prize of a Henry dryer was won by Mr. M. W. Berberet. This prize was presented by the Republic Electric Co.

Following the meeting, the Ladies' Auxiliary served lunch to the members, which was greatly enjoyed by all.

March 10—During the course of the business of the evening, Entertainment, Educational and Membership Committees were appointed to serve for the balance of the year.

Plans have been made to set aside the night of April 28th as Peerless Night, at which time a representative of the Peerless organization will be present to show movies and their methods of manufacture and to give a talk on products of their company. The Secretary was instructed to write to Peerless of America, Inc., confirming the present plans.

BOSTON CHAPTER

February 13—The chapter had the pleasure of hearing Mr. Ulbert and Mr. Dawson of the Alco Valve Co. give a talk on the equipment made by their concern, who also demonstrated with the glass tube evaporator the action of vapor gas, liquid gas and oil with the evaporator rotated in several different positions. The meeting was very instructive and was very well attended.

MISSOURI VALLEY CHAPTER

February 16—Mr. A. Jones, chairman of the Educational Committee, introduced the first speaker of the evening, Mr. N. E. Jennison, assistant sales manager of the Penn Electric Switch Co.

Mr. J. G. Moravec, district branch manager of the same company was also present and introduced by Mr. Jennison. Mr. Jennison gave an interesting talk on the construction and operation of refrigeration controls produced by his company.

The talk was accompanied by a movie which showed factory production. A demonstration of the action and movement of this control was shown through a large jumbo five-foot model built especially for this purpose.

Mr. Jennison then introduced Mr. Haberman, lubrication engineer for the Texas Co. Mr. Haberman gave an interesting talk on lubricating oils for refrigeration.

The business of the evening followed the educational program and among other things a representative of the chapter was elected to participate in the formulating of a refrigeration code for the city of Omaha.

March 2—Mr. R. J. Thompson of the Kinetic Chemicals Co. was the speaker of the evening, introduced by Mr. Jones.

The talk given by Mr. Thompson was an unusually interesting one and proved to be highly educational, covering the history of the development of the Freon

FOR COMMERCIAL USE Mills Compressors

★ Mills Novelty Company

4100 Fullerton Avenue, Chicago, Illinois

SOLD ONLY THROUGH SERVICEMEN, DEALERS, AND DISTRIBUTORS

Snap-on

**SPECIALIZED TOOLS
FOR REFRIGERATION SERVICE**

Drivers for Every Job!

Strong . . . solid . . . dependable—just the right length blade and tip for every screw-driver job. Long handles that reach 'way in and short handles for close-up jobs.

You'll save time—every time—with a screw-driver that "fits the job" . . . you'll be prepared to tackle the tightest and the most awkward-to-reach screws with your selected group of Snap-on Blue-Point screw-drivers.



SNAP-ON TOOLS CORP.
KENOSHA, WIS.

Ask the Snap-on man who calls on you to show you his complete screw-driver line and special tools for faster, easier refrigeration service work, or phone the nearest Snap-on branch office for information and prompt service.

Snap-on
Socket Wrenches

*The Choice of
Better Mechanics*

Blue-Point
Mechanic Tools

group of refrigerants, their physical properties and applications, together with numerous demonstrations of Freon to prove its non-toxicity, and other advantages, among the refrigerant family of gases.

The second speaker of the evening was Mr. H. W. McPherson of the Electrimatic Corporation of Chicago, who gave an instructive talk on various styles of automatic refrigeration valves and explained the construction of the most recent developments by his company.

The balance of the evening was taken up with the business of the chapter.

LOS ANGELES CHAPTER

March 13—The meeting was called to order by President J. C. Rodgers. As it was a joint meeting of the R.S.E.S., the A.S.R.E. and the N.A.P.R.E. societies, a motion was passed that no business be announced.

An announcement of the N.A.P.R.E. Jamboree to be held March 22nd was made by Eddie Nelson. Mr. Van D. Clothier, chairman of the A.S.R.E. local chapter was introduced by President Rodgers.

Mr. J. C. Blair, chairman of the Educational Committee of the chapter, announced a tube bending contest to be held at the April meeting. Mr. Blair then introduced Mr. K. B. (Spike) Thorndyke, Mr. E. J. O'Connell and Mr. T. C. McKee, Jr., all representing the Detroit Lubricator Co.

The meeting was turned over to Mr. McKee who gave a very interesting talk on thermostatic expansion valves, controls and solenoid valves. It was

substantiated by a sound film which was sponsored by the Detroit Lubricator Co.

DAYTON CHAPTER

March 3—It was decided at this meeting that as a future practice an attendance prize for each meeting would be offered as encouragement to better attendance. Each member will be given a number and drawing will be made by means of a pin wheel to determine the winner. An attractive prize will be given at each meeting.

The educational program of the evening consisted of a Quiz Contest. Prizes were offered for the two highest scores and much educational and entertaining value was received from this feature.

March 17—The members were entertained by a visit from Mr. M. W. Knight of Peerless of America, Inc., who displayed a large assortment of coils and explained their wide range of uses. In addition to the products he described, Mr. Knight showed a moving picture of the Peerless plant and their method of manufacture.

Following this, and getting away from the more serious side, Mr. Knight displayed some interesting pictures taken in Mexico during a recent vacation trip. One hundred and twenty-five members and visitors were present for this meeting and they all found it to be of considerable interest.

CENTRAL INDIANA CHAPTER

March 7—The usual business routine was dispensed with to attend a meeting of the Frigidaire

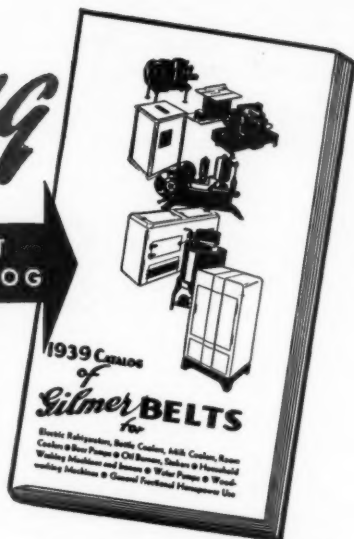
WHEN Swearing WON'T HELP

SEND FOR THE NEW **Gilmer** BELT CATALOG

It gives you the most complete f.h.p. belt listings in the world: Over 5700 models and 149 makes of electric refrigerators. Also includes washing machines, air-conditioners, oil burners, stokers, etc. Listed by lengths, cross-sections, and manufacturer's part numbers.

You can't miss with Gilmer! There are no makeshift fits with Gilmers. They fit right because they're built by engineers who build only belts . . . "tailor-made in the groove" on the world's largest assortment of V-moulds.

When you're back of the 8-ball . . . call your Gilmer Jobber. He carries a full stock of standard and hard-to-fit sizes.



L. H. GILMER COMPANY
Tacoma, Philadelphia

service men at the Spencer Hotel. This meeting was conducted by Mr. Lee Konrath of Indianapolis and was very enlightening to all present.

A large delegation of the Central Indiana Chapter attended, including members and service men from Anderson, Kokomo, Elwood, Gas City, Hartford City, Montpelier, Warren, Huntington, Wabash, Peru, Amboy and LaFontaine.

March 21—The Central Indiana Chapter held a party in the Indiana General Service Club Room at Marion. A large assembly of service men and their wives from Muncie, Peru, Kokomo, Huntington, and Anderson was present. Entertainment, games, and cats were on the menu for the evening. What everybody enjoyed most were the prizes and cash awards.

ROCKFORD CHAPTER

March 6—Announcement was made of a tube bending contest to be held at the next meeting and Mr. F. Barney, educational chairman, asked for voluntary contestants. The first prize for the contest will be donated by the VanDenberg Supply Co.; the second prize by Gustave A. Larson Co., and the third prize by Rockford Chapter.

The first speaker of the evening was Mr. Victor Lathers of the Barber Colman Co. of Rockford, who gave an interesting talk and displayed pictures of their grills as used in heating and cooling equipment.

Mr. Fine of the Kerotest Mfg. Co. was a visitor for the evening and gave a few brief remarks of greeting to the group.

Refreshments followed the meeting.

March 20—Mr. W. Odenheimer was the lucky member to be drawn as recipient of the attendance prize which amounted to \$6.10. This amount has been accumulating from several meetings previous, during which time the owners of the names drawn were not present.

Mr. Bob Anderson of the Imperial Brass Mfg. Co. conducted a tube bending contest as the feature of the educational program for the evening. Winners of the contest were as follows: 1st prize, Harry Wardecker—time 31½ minutes; 2nd prize, R. C. McCarthy—time 21½ minutes; and 3rd prize, Earl Seaton—time 21¾ minutes. The time keeper was Mr. Don VanDenberg of the VanDenberg Supply Co., and the judges were W. Larson, Chas. Henley and W. G. Clover.

PITTSBURGH CHAPTER

March 10—The educational program opened with a discussion of air conditioning as it affects the refrigeration service engineer and was conducted by Mr. N. D. Wagener.

Following this discussion, Mr. Wagener announced the program for the May meeting would consist of a sound film and slides on the Detroit thermostatic expansion valve.

Further announcement revealed a tube bending contest would be held under the auspices of the J. Woodwell Co. on Tuesday, April 11th.

WESTERN MASSACHUSETTS CHAPTER

February 15—Mr. Ulbert, a representative of the Alco Valve Co., put on a demonstration of their thermostatic valves, with their glass tube coil. With the flexible tube connections, he was able to place the coil in almost any position to demonstrate the various flows. The boys were much absorbed by this and obtained much information from this lecture.

Mr. Underhill of the Cork Import Co. gave a treatise on the manufacture of sectional and sheet cork, starting with the trees in Spain and Portugal and bringing us to the present scientific manufacture.

This was a very special meeting, because that same night Mr. Davis, representing the Bush Mfg. Co. of Hartford, Conn., demonstrated their flash coolers and several different types of coils. About 60 members and guests attended this meeting, 18 of whom had come a distance of fifty miles to hear these educational lectures.

March 8—Mr. Honcker of the Fedders Mfg. Co. gave a very interesting discourse on the Fedders thermostatic expansion valve, taking one apart and allowing the boys to inspect the various parts and

to re-assemble them under his supervision. A moving picture accompanied his talk.

At this meeting also, Mr. Hudetz of the Henry Valve Co. had a whole grip full of dryers and strainers which he demonstrated very ably.

KANSAS CITY CHAPTER

February 14—Following the business session of the evening, the meeting was turned over to educational work, the feature of which was the third lecture on air conditioning given by Mr. Pehl.

After this lecture was completed, the Chairman of the Membership Committee announced a special party to be held at the home of Mr. T. L. Anderson. This party is to be given to the winners of the Membership Drive by the losing team.

February 28—Mr. H. F. Andrews reported that the party at Mr. Anderson's home on February 25th was a huge success.

Mr. S. A. Leitner complimented Mr. R. E. Mecker on his winning of the first prize in the Service Kink and Tool Contest conducted by the Official Organ.

On the educational program for the evening Mr. Pehl discussed another lecture of his air conditioning course, following which he told of the advantages members might derive from taking a course in public speaking.

Imperial Flaring Tools



● With an Imperial flaring tool you make exactly the right type of S.A.E. flared joint so that you can be absolutely certain of a tight connection. Self centering yoke. No danger of cracking or splitting tube.

Equip yourself with one of these inexpensive flaring tools for handling copper, brass or aluminum tubing work. Ask your jobber for complete information or write for catalog.

THE IMPERIAL BRASS MFG. CO., 1204 W. Harrison St., Chicago, Illinois

IMPERIAL

Air Conditioning and Refrigeration Products

VALVES • FITTINGS • TOOLS • CHARGING LINES • FLOATS • STRAINERS • DEHYDRATORS

ORDER FROM
YOUR JOBBER

MADISON CHAPTER

February 14—The meeting was called to order by President M. Robertson and after the usual routine of cleaning up the past year's business Mr. Robertson presented the gavel to the newly elected president, Mr. P. F. Noth.

In discussing the plans for the coming year, with particular reference to the educational programs, Mr. Noth suggested that two permanent teams be selected for the purpose of conducting Quiz Contests at regular intervals.

It was further suggested that collections be taken from time to time to be accumulated as a prize for the highest scores in the contest.

At the close of the meeting, Mr. G. Larson distributed pamphlets on the new product, Ice-X, manufactured by the Ansul Chemical Co.

February 28—Following the suggestions made at the previous meeting, two teams were picked by the appointed captains, O. Johr and H. Struthers for the Quiz Contest to be held during the evening. Mr. Wm. Gauger, guest speaker of the evening, acted as judge. Mr. Struthers' team won the contest, with C. Buschkopf securing the highest points.

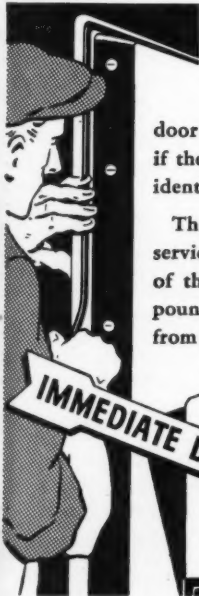
On the educational program of the evening, Mr. W. Gauger of the Commercial Coil and Refrigeration Co. explained how their new type beer cooler operates.

LADIES' NATIONAL AUXILIARY

MRS. C. A. BRUNTON, national president of the R.S.E.S. Ladies' Auxiliary announces the completion of their constitution and by-laws and the adoption of an official membership application form. Work of the auxiliary has been going forward steadily under the guidance of its national officers and it is hoped that the ladies of all chapters will cooperate in the formation of their local organizations. National officers of the Auxiliary are:

President—Mrs. C. A. Brunton, 2225 9th Ave., Huntington, W. Va.
1st Vice-President—Mrs. M. T. Jackson, 423 Parkside Drive, Toronto, Ont., Can.
2nd Vice-President—Mrs. N. D. Wagener, R. 7, Butler, Penna.
Secretary—Mrs. E. V. Black, 20 Lincoln St., Uniontown, Penna.
Treasurer—Mrs. G. O'Hara, 11 Montcalm St., Buffalo, N. Y.
Sergeant-at-Arms—Mrs. E. J. Seaton, 3214 10th St., Rockford, Ill.
Directors—Mrs. M. S. Axelrod, 5814 W. Chicago Ave., Chicago, Ill.; Mrs. W. C. Kent, 1044 3rd Ave., W., Birmingham, Ala.; Mrs. J. A. Salter, 3607 E. Michigan St., Indianapolis, Ind.; Mrs. G. A. Burns, 49 Glenmanor Drive, Toronto, Ont., Can.; Mrs. W. C. Metcalf, 117 N. Center St., Joliet, Ill.

SELL THE "ORIGINAL EQUIPMENT" LINE OF *Miller Replacement Door Gaskets*



★ Service men who take pride in their work come to Miller for their replacement door gaskets. Why? Because they know that Miller, as the largest supplier of rubber door gaskets to the refrigeration industry, is their logical source if they wish to replace original gaskets with ones which are identical both in design and quality.

The Miller line of replacement door gaskets enables you to service 80% of all refrigerators regardless of make. Every one of the 28 different types is made of rubber specially compounded for resistance to grease, aging, and wear, and produced from the original equipment dies.

To obtain price list and dimensional drawings, call your local jobber or write

MILLER RUBBER COMPANY, INC.

AKRON, OHIO

Miller

"Engineers in Rubber"

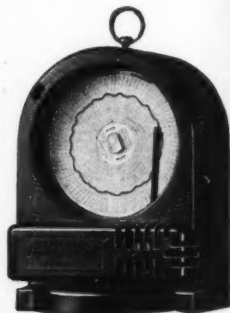
Reduce service complaints; use these recording instruments THOUSANDS IN USE HAVE PROVED THEIR VALUE

Prove your service work was done correctly and you stop unnecessary complaints and call-backs. Charts made by a Practical Recording Thermometer, or Operation Recorder, show you and your customer the facts, without argument. This is why so many servicemen use Practical instruments on every job.

RELIABLE & CONVENIENT Practical instruments give you 24 hour records of temperature or motor running-time. Eight years of use in the refrigeration industry have proved their reliability. Thousands of Practical instruments are now being used for all kinds of test work. They are convenient to use and are as easy to handle as an alarm clock. The pen mechanism is entirely contained in the door and swings out of the way when you open the door to change the chart. The chart itself is die-cut to fit a special hub, which holds the chart without pins or other loose parts. These reliability features are exclusive with Practical instruments. Write for complete information, including terms, specifications, guarantee, and 15-Day Trial Offer. Write today for Instrument Bulletin! Practical Instrument Co., Dept. G, 2717 N. Ashland, Chicago.



Operation Recorder
\$21 with metal carrying case



Recording Thermometer
\$18 with metal carrying case

NOW

**USE PRACTICAL INSTRUMENTS
BUY FROM YOUR SUPPLIER**

PITTSBURGH LADIES'

ON January 18th the ladies met at six p. m. in a little dining room at 212 Oliver Avenue and participated in a delicious dinner, after which they attended a theatre.

On February 10th a meeting was held at Gammon's Restaurant where a luncheon was served and a brief business meeting was conducted.

CONTROVERSY IN THE CENTRAL NEW YORK CHAPTER

THE Central New York Chapter reports that two of their well-known members, William R. Andrews, secretary, and George A. Davenport, recently became fathers of baby girls.

The chapter, however, has not as yet seen any cigars and when the fathers were confronted with this fact they promptly replied that in odd years the cigars were supposed to be given to the fathers and in even years the fathers were to buy the cigars.

After some debate on the question the matter has been tabled due to a lack of authentic information. In the meantime the chapter has issued an appeal to all members who may have information on this point of etiquette to please communicate.

NEW SELF-CONTAINED FIVE- AND TEN-TON CONDITIONERS

A CONTINUATION of progress in the field of air conditioning was announced today by officials of the Delco-Frigidaire Conditioning division of General Motors Sales Corporation with the introduction to the industry of two new and larger self-contained air conditioning units, supplementing the three-ton unit produced last year.

The five-ton unit, SC-500, presents a new feature in exact air distribution by "Individual vane control" of the air outlet grilles. It is an entirely self-contained unit; it is portable, and it occupies a comparatively small floor space in a retail store, measuring 44 by 22 inches. Equipped with a Frigidaire five-ton, two-cylinder compressor and multipath coil, its condenser unit is powered with a five-horsepower motor and all controls are placed on a concealed but conveniently located panel.

The ten-ton unit is a product designed for the top load bracket in the unit conditioning field. Also entirely self-contained, it is constructed for use with easily installed supply and return air duct connections to the areas designated for conditioning.

*A Record of 19 Years
Performance PROVES
its worth to You!*



Artic
REG. U. S. PAT. OFF.

*The Preferred METHYL CHLORIDE
for Service Work*



E. I. DU PONT DE NEMOURS & COMPANY, INC.
The R. & H. Chemicals Department
Wilmington, Delaware

District Sales Offices: Baltimore, Boston, Charlotte, Chicago, Cleveland,
Kansas City, Newark, New York, Philadelphia, Pittsburgh, San Francisco

Officials of the organization point out that both these new units present a sound and

economical solution to the present need for commercial air conditioning. This compact equipment, coupled with the latest mechanical developments in the industry, is expected to afford businessmen a valuable opportunity to keep pace with the times at an economical minimum.

NEW METAL CASE FOR RECORDING THERMOMETER

FOR better protecting their portable recording thermometer, Practical Instrument Company has introduced a metal carrying case in place of the previous heavy fibre type. A strong carrying case is very necessary for this type thermometer because it is used as a portable field or plant instrument, and is constantly being carried between jobs. The new metal construction gives better protection against falling objects and bumping.

The Practical Recording Thermometer has proved useful in a wide variety of work such as refrigerator service checking, building management, air conditioning surveys, and heating equipment selling. It has been adopted by heating engineers, florists, apart-



NEW TEN-TON AIR CONDITIONER

Cut-a-way view of Delco-Frigidaire's new ten-ton, self-contained air conditioning unit for stores and shops. The unit is designed for use with easily installed metal ducts to carry the air some distance away from the unit for more general distribution.

ment managers, oil burner salesmen, and refrigerator manufacturers.

Aside from its adaptability to many types of temperature measurement work, an outstanding feature of the instrument is its sturdy, sturdy construction and ease of op-



ILLUSTRATING THE NEW CARRYING CASE

eration. All of the pen mechanism is in the door. The chart is die cut to fit a special hub. Extra charts and ink are carried in the back of the instrument itself.

Complete information about this new portable thermometer unit can be obtained from Practical Instrument Company, 2717 N. Ashland, Chicago.

USE

SOLIDS-LIQUIDS-GASES-SOLIDS-LIQUIDS-GASES-SOLIDS
LIQUIDS-GASES
DRIERITE
LIQUIDS-GASES-SOLIDS-LIQUIDS-GASES-SOLIDS

FOR DRYING AIR REFRIGERANTS INDUSTRIAL GASES

DRIERITE is an Efficient, Rapid, Economical Dryer for all the Modern Refrigerants. Dries both by Chemical Action and Adsorption.

Used in Dehydrators by leading manufacturers and furnished to the Service Engineer by leading Supply Dealers.

Write for literature.

W. A. HAMMOND DRIERITE COMPANY
YELLOW SPRINGS, OHIO

NEW GAS REPLACES F114

SOLVING one of the more difficult problems of the Service Engineer which has become increasingly acute during the past two or three years, the Modern Gas Co., Inc., announce the introduction of a replacement gas for F114 known as "Herveen."

In the past it has been impossible for independent service organizations to service Frigidaire hermetic units because they were unable to purchase F114. The only manner in which these units could be charged was by returning them to the factory.

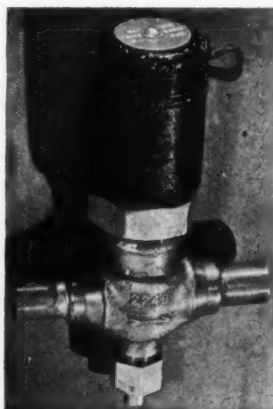
"Herveen" is a replacement gas for F114 and may be used in Frigidaire hermetic units.

For delivery, contact your local jobber or write to Modern Gas Co., Inc., 1084 Bedford Ave., Brooklyn, N. Y.

\$\$\$

IMPERIAL INTRODUCES COPPER TUBE MANIFOLDS SOLD "IN BULK"

NEW hard copper tube manifolds for use with standard two-way line valves for refrigeration and air conditioning work have



Series K-155F

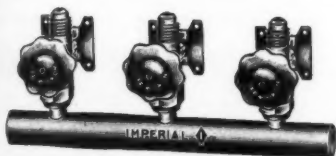
GENERAL CONTROLS REFRIGERANT STOP VALVE

Write today for our catalog describing the General Controls line of refrigerant controls.

GENERAL CONTROLS
450 E. Ohio St. 267 5th Ave.
Chicago, Ill. New York City

been announced by The Imperial Brass Mfg. Co., 1200 W. Harrison Street, Chicago, Ill.

In connection with these new manifolds, this company is promoting the idea of buying manifolds "in bulk," that is, with 12 openings and then cutting the manifold for the required number of valve openings with



NEW IMPERIAL MANIFOLDS

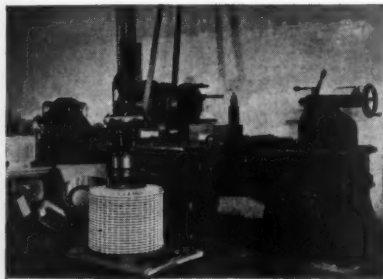
a tube cutter. It is claimed that this practice not only reduces manifold costs substantially, but also adds convenience since any length manifold is immediately available, and inventory requirements on manifolds are reduced to a minimum.

For those who prefer manifolds cut to length, however, the manifolds are also sold by jobbers with two, three, four, five and six valve openings as well as with 12 openings.

Manifolds are made from Type K copper pipe and are furnished with flare connections, having a brass forged flare nut, or with solder connections. In either type, the connections are silver soldered into the pipe on four inch centers. In making an assembly, two-way line valves are connected to the manifolds, and the complete assembly is mounted by means of the mounting brackets on the valves.

Large O.D. tubing is used for all manifolds so that there is no restriction to the flow of gas. Manifolds are furnished without valves and are designated as No. 188-F when furnished with flare connections and as No. 188-S when furnished with solder connections.

Manifold adapters which make it possible to make practically any connection to the ends of these manifolds are also offered. Manifolds and adapters are completely described in the new Imperial No. 88-H Refrigeration Catalog.



Re-assembling a G. E. monitor top, Model D-50-B-88 (Commercial Unit) in our shop

Refrigerator Dealers and Service Men

**Give us your
Hermetic Headaches**

**Complete Rebuilding and Repairs on All
Models**

**Specializing on Westinghouse, G. E. Monitor
Tops and Majestics**

Complete Machine Shop Service

Write for Prices—Specify Makes and Models

Flushing Refrigeration Co., Inc.

HERMETIC ENGINEERS

133-22 41st AVE., FLUSHING, N. Y.

It's Ready! **AIRO** CATALOG OF **REFRIGERATION** *Air Conditioning* **PARTS—TOOLS—SUPPLIES**

We're mighty proud of this new catalog. In fact, we'd like to call it "OURS". . . but that wouldn't be fair to you servicemen who, by your loyal patronage, helpful suggestions and willingness to cooperate have made this fine book possible. Therefore we repeat—YOUR catalog is ready. Send for your copy on your letterhead.

AIRO

SUPPLY COMPANY

2732 N. ASHLAND AVE
CHICAGO  ILLINOIS

OUR NEW CATALOG!



Complete in every detail—a veritable reference book for the entire refrigeration and air conditioning industry.

**READY ABOUT
APRIL 15TH**

After months of preparation this new edition will be ready for your use in time for the busy months.

SEND IN YOUR REQUEST TODAY

To assure yourself a copy of this catalog send in your request on your business stationery today. You will not be obligated in any way.

REMEMBER—Your every need has been anticipated and the answer will be found in our new catalog FULLY DESCRIBED AND ILLUSTRATED.

AUTOMATIC HEATING & COOLING SUPPLY CO.

647 West Lake Street

Chicago, Illinois

NEW CATALOGS AND BULLETINS

MANUFACTURERS FIN COIL Co., for the past fifteen years, have been connected with the refrigeration industry, thus laying the foundation for a thorough understanding of what is required of commercial and air conditioning coils.



COVER OF
MANUFACTURERS
FIN COIL CO.
CATALOG

Having the cooperation of numerous manufacturers in the refrigeration industry, and with the help of mechanical and thermodynamic engineers, they built fin coils which



BY PASS TOOL

Quick method to clean strainers. By passes refrigerant to low side. No pinching off, no heating lines. Completely discharges liquid line. Clamps on near receiver, valve stem punctures line. After making repair, cut off and reflare.

Price \$2.50

See your jobber or send order to
REFRIGERATION TOOL CO.
LIMA, OHIO

COLTROL
POSITIVE CONTROL
LIQUID COOLERS

COMMERCIAL COIL and
REFRIGERATION CO.
459 N. Artesian Ave., Chicago

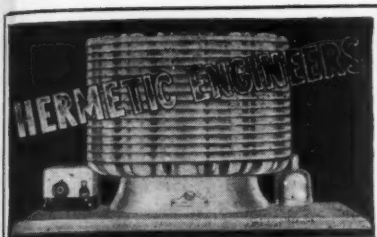
were installed and "Purpose-Tested" to give those results which the industry had a right to expect. Later it was decided to extend the facilities of this plant to all those in the refrigeration industry who would want to have their coils "Purpose-Tested".

The immediate response to this decision caused the Company to catalog their features in order to avoid unnecessary delays. Capable engineers have rated the coils on the pages of a newly issued catalog and the purchaser may feel certain that "Purpose-Tested" Fin Coils ordered from the specifications and charts will perform in accordance with their rated capacities.

Write the Manufacturers Fin Coil Company at 2505 South Pulaski Road, Chicago, Ill., for your copy of this catalog.

ROTARY SEAL COMPANY now have available for distribution a stock list 12 $\frac{3}{4}$ inches x 19 inches, for the Refrigeration Service Engineers. This is in a convenient size intended for hanging on the wall.

All seal listings are in large type and are properly indexed, alphabetically by name of machine so that the correct replacement for any compressor may be readily found. These



GENERAL ELECTRIC
WESTINGHOUSE
MAJESTIC
CROSLEY

U. S. RADIO
SERVEL
GIBSON
COLDSPOT

12 to 18 Months Guarantee
Write for Attractive Prices

ALSO REPAIR OF

AUTOMATIC EXPANSION VALVES
MODERN TYPE DOMESTIC COLD CONTROLS
WATER VALVES
HIGH AND LOW SIDE FLOATS
WATER COOLED CONDENSERS
COMPRESSOR OVERHAUL

CAPITOL CITY MFG. CO.

MAPLEWOOD MANOR
LANSING - - - MICH.

stock lists are available without charge to anyone associated with the Refrigeration Servicing industry. Just write the company at 809 W. Madison Street, Chicago, Illinois, on your letter head or enclose a business card and it will be mailed to you immediately.

AIRO SUPPLY COMPANY, 2732 N. Ashland Ave., Chicago, Illinois, announces the release of its 1939 Catalog & Buyers Guide. According to C. R. Markham, Advertising Manager of the company, the new Airo catalog was prepared with the close cooperation and assistance of servicemen throughout the industry with the idea of making it an ideal buyers guide.

"About two years ago, we decided servicemen should have a hand in the preparation of the Airo catalog in as much as the book is prepared for their use. Consequently, we sent questionnaires to servicemen in every section of the United States inviting them to submit suggestions for improving the catalog. As a result of the splendid cooperation given by these servicemen the Airo catalog has been improved until we feel it practically belongs to them," commented Mr. Markham.

CONTROLS GASES *Healthguard* Fume Kit



Handiest "tool" a refrigeration serviceman can have. Will save his health, make his work easier. Ideal to meet emergencies due to refrigerant leakage. Light and compact. Neat, handy, strong carrying case. Filter cartridges available for Ammonia, Methyl Chloride and Sulphur Dioxide. Write today for literature and prices.

CHICAGO EYE SHIELD CO.

2141 WARREN BLVD.

CHICAGO, ILL.

Manager E. W. Scotten has added a complete stock of replacement parts for Mills compressors and condensing units to the line in addition to the following new items: Ice-X, new Fedders domestic coils, newly designed A. P. valves and replacement parts for Brunner compressors. Mr. Scotten has also increased his force to assure prompt service during the peak season.

As a protection to dealers and servicemen those desiring catalogs are asked to show their connection with the refrigeration and air conditioning industry by sending a letter-head, business card or bill head with their request.

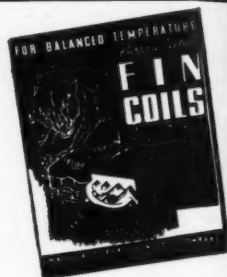
KEROTEST MANUFACTURING Co. have just issued their new Catalog No. 9 to the refrigeration trade. Consisting of 32 pages with colored illustrations the catalog shows a complete list of brass fittings, valves of all types, charging stands, purging and charging kits, strainers, filters, scale trips, liquid indicators, dryers, manifolds, etc.

For your copy of this catalog write Kerotest Manufacturing Co., 2525 Liberty Avenue, Pittsburgh, Penn.

YOU SHOULD HAVE THIS BOOK NOW READY FOR MAILING

Our big new free catalog is now ready. In it we list the finest products the service man can use. "Thermo" Fin-in-tube, steel fin coils, walk-in-cooler coils, bunker coils, display case coils, bare tube coils, "Boreas" blower units, air conditioning coils, cascade air-flow pans, the new ice cube maker, and direct expansion coils for air conditioning. Write for it on your letterhead.

MANUFACTURERS FIN COIL COMPANY
2505-7 So. Pulaski Road CHICAGO, ILL.



TRENTON AUTO RADIATOR WORKS have just issued a new bulletin on Kramer Triple-Trough Baffles and Streamline Coils for walk in coolers.

For a number of years, the refrigerating industry has looked upon the open louver metal baffles as nothing more than a piece of sheet metal work. This is an erroneous view. Actual life experience is forcing the industry to study this very useful refrigeration device in a more fundamental and critical manner.

Right from the start, Kramer has looked at the open louver baffle as an engineered device definitely tied up with the refrigerating cycle in commercial refrigeration. The Triple-Trough baffle is, therefore, years in advance.

The new baffle is the result of a long period of intensive research on open louver metal baffles. After studying and testing every known design, it can definitely be said that the Triple-Trough is unequaled in performance and appearance.

Careful tests revealed that the spacing as well as the design of the louvers are the two major factors affecting the performance of the drain baffles.

The relative position of the louvers in the

baffles not only improves over-all coil performance but also definitely minimizes any chance for moisture collection.

The addition of the third trough is a radical departure from the traditional design of the louver. This design permits the use of a deeper primary trough and further reduces dripping to a minimum, making it practically proof against dripping.

PEERLESS PLANT AT DALLAS

PEERLESS of America, Inc., opened their fourth factory in the United States, in Dallas last month. This branch has complete facilities for manufacturing their entire line. The factory is located at 2218 North Harwood Street, Dallas, and represents an investment of \$50,000 in machinery and material. It consists of 12,000 square feet of floor space.

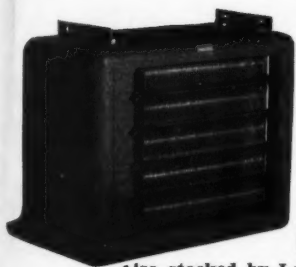
The new plant will manufacture such products as fin coils, unit coolers, flash coolers, finned tube makers, heat exchangers, controls, product coolers, and air conditioning products. They will also carry a large stock of expansion valves and household

WORLDS' LARGEST REBUILDERS MAJESTIC, G. E., WESTINGHOUSE & GRUNOW UNITS

• PARTS FOR MAJESTIC & GRUNOW •

\$200,000.00 stock of parts and 1000 units, for prompt service to you. 18 months written guarantee on units. Send for price list.

G & G GENUINE MAJESTIC REFRIGERATOR & RADIO PARTS SERVICE
5801 DICKENS AVENUE CHICAGO, ILLINOIS



REMPE UNITS

for Cooling Efficiency

336 different units to cover every condition, every problem, any installation. Get Bulletin 105. Shows how to make the correct selection for the right results. Saves you time, saves you money.

REMPE CO. 340 N. Sacramento Blvd., CHICAGO

Also stocked by Leo S. Bosarge Co., 315 Spring St., N.W., Atlanta, Ga.

evaporators, which are manufactured at the main factory in Chicago, Illinois.

Their outstanding method of manufacture is the automatic machines which manufacture the fin coils and the new Thermek coil. All coils, etc., are manufactured upon receipt of order. This enables the company to give twenty-four hour service from the time that the order is received at the factory until the customer receives his merchandise.

Opening this plant in Dallas takes care of a territory which has long been served from the Chicago plant, but due to slow trans-

portation methods, Peerless has been prompted to open the Dallas plant to better take care of the Southwest territory which consists of Texas, New Mexico, Oklahoma, Arkansas, Louisiana, and Mississippi. Also, by having a plant in Dallas, there will be closer contacts with the Refrigeration Supply and Parts Jobbers in the Southwest territory, as well as trade in general.

The Company has been in business for the past twenty-seven years, having been established as the Peerless Ice Machine Company in 1912. At that time they manufactured ice machines for large multiple apartment



The New
Peerless of
America Inc.
Factory at
Dallas, Texas.
The building has
a floor area of
12,000 square
feet

Again! U. E. I. is first Choice

Service men and beginners, who feel their progress is limited by lack of proper training, are invited to write for details of this easy, spare-time, training program.

Through the years executives in the refrigeration and air conditioning industries have learned to depend on U. E. I. for properly trained technicians.

In fact, many of these executives have taken U. E. I. training. Therefore . . . when Philco Radio & Television Corp. entered the refrigeration and air conditioning industries they entrusted the important task of training their service organization to the pioneer school of the industry.

UTILITIES ENGINEERING INSTITUTE
404 NORTH WELLS ST. CHICAGO, ILLINOIS

In CANADA

Write for Big New 1939 Catalog

Your letterhead brings this to you.
No charge.

**REFRIGERATION
SUPPLIES CO., LTD.**
LONDON • ONTARIO

house systems, etc. In 1929 they gave up the manufacture of ice machines and devoted their entire manufacturing facilities to refrigeration and air conditioning coils. They have developed many new items, and the outstanding new item today, is the new Thermek coil, which is made of heavy wall copper tube on a special machine which cuts the tubing, producing spine-like extended surfaces, from the parent metal of the tube wall. This is used in Peerless unit coolers and their air conditioning coils and units exclusively, making smaller packages and a more efficient product.

Mr. M. J. Meiklejohn who has had many years of experience in the refrigeration business, and who has been with Peerless of America, Inc., for the past two and one-half years, is the manager of this new factory, and Mr. W. A. Honeychurch, who has had many years of refrigeration and air conditioning experience and in the Peerless organization for the past two years, is assistant manager and has charge of the air conditioning business in that territory.

The new factory will employ men from Dallas, and many raw materials will be obtained in Dallas.

Jarrow Replacement Door Gaskets



1761

The gasket illustrated was made especially for WEST-INGHOUSE replacement. It fits. ALL JARROW gaskets are built to Manufacturers' specifications. INSIST on JARROW gaskets. Your nearest Jobber has them.

JARROW PRODUCTS CORPORATION
420 N. LaSalle St., Chicago, Ill.

SHIPPED THE SAME DAY

SABBITT	COPPER CONTACTS
BRONZE BEARINGS	ELECTRIC PORTABLE
BRONZE BUSHINGS	BLOWERS
BRONZE HAMMERS	ELECTRIC SOLDERING
BRUSH HOLDERS	POTS
BRUSH SEATING STONES	FELT WICKING
CARBON BRUSHES	FIBRE WASHERS
CARBON CONTACTS	INDUSTRIAL VACUUM
CARBON PLATES	CLEANERS
COMMUTATOR FILES	SHUNT TERMINALS
COMMUTATOR STONES	SHUNT WIRE

WM. F. MAGUIRE CO.
ELECTRICAL SPECIALTIES
128 No. Clinton St. Tel. Randolph 9117
CHICAGO

PHILCO SELECTS UTILITIES FOR TRAINING PROGRAM

ROBERT F. HERR, Manager Parts & Service Division of Philco Radio and Television Corp., announces the completion of plans to provide specialized training in refrigeration and air conditioning to Philco employees and members of the Philco dealer service organization.

"Realizing the importance of having a well-trained service organization, no stone will be left unturned in our efforts to give the public the same dependable service from refrigerating and air conditioning equipment as we have always striven to give them with their radios," says Mr. Herr.

"Not only does this training program cover the new Philco Conservador Refrigerator and Cool Wave Air Conditioner, but it also thoroughly covers other units on the market," he continued. "Buyers of Philco products have learned to expect the very finest service and it is our intention to extend this same efficient service to users of refrigerating equipment," concluded Mr. Herr.



**HERE YOU
ARE MEN!**

**BLYTHE'S 1939
CATALOG, IT'S
NEW! IT'S FREE**

WRITE FOR IT ON YOUR LETTERHEAD
H. W. BLYTHE CO.
2334 S. MICHIGAN, CHICAGO
Refrigeration & Air Conditioning, Parts, Tools
and Supplies

**NOW TUBING CAN BE
PINCHED IN 5 SECONDS**

**WITH
VISE-GRIP
PINCH-OFF PLIERS**

Makes Pinch-Offs that are Gas
Tight—Holds onto Tubing by
Itself Until Released.

**VISE-GRIP
PINCH-OFF PLIERS
PRICE \$1.95**

For Sale by Leading Jobbers or
Direct From

REFRIGERATION SERVICE, INC.

3109 BEVERLY BLVD., LOS ANGELES, CALIF.



Canadian Servicemen

We give 24 hour
delivery on either
Feeders or Peer-
less coils. We stock
controls — seals —
units, etc.



**AIRCO REFRIGERATION
PARTS**

706 Aqueduct St., Montreal, Quebec, Canada

Utilities Engineering Institute to Conduct Training

This new Philco training program will
be conducted by Utilities Engineering In-
stitute of Chicago. All subject matter has
been carefully selected to fit the needs of
the present Philco service organization
which is already well established.

Beginning with the basic principles of re-
frigeration and air conditioning and con-
tinuing, step by step, through each phase of
domestic service work, the entire training
program is both interesting and highly edu-
cational. It is expected that by the time
the new Philco refrigerator is presented to
the public, thousands of dealers and mem-
bers of the Philco "Radio Manufacturers
Service" organization will be participating
in this specialized training program.

L. P. WHITE TO REPRESENT REPUBLIC ELECTRIC CO.

MR. LEO P. WHITE has become a
representative of the Republic Elec-
tric Company in Davenport and he will be

the dealer contact man and refrigeration en-
gineer in the Tri-Cities which covers Rock
Island and Moline in Illinois and Davenport
in Iowa.

MODERN EQUIPMENT CORPORATION REPORTS FOR 1938

THE Modern Equipment Corporation of
Defiance, Ohio, and their parent Com-
pany the Lynch Corporation of Anderson,
Indiana, have just issued their annual con-
solidated report for the year 1938, showing
net earnings after deducting federal taxes
of \$829,419.68.

This is equal to \$2.33 a share on the capi-
tal stock of the Lynch Corporation. Divi-
dends amounting to \$278,882 were paid dur-
ing 1938 leaving \$50,537.68 which was added
to surplus.

The sales of the Modern Equipment Cor-
poration Division, for the first quarter of
1939 were 40% ahead of the same quarter of
1938. Sales outlook continues very bright
with the expectancy of the same percentage
gain being maintained throughout the bal-
ance of the year.

You NEED This

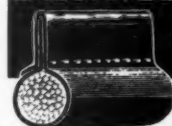
This **HEAD PRESSURE CALCU-
LATOR** gives you **HEAD PRES-
SURES** for ANY air cooled installa-
tion using SO₂,
Methyl, or F-12.

Price \$1.25. See your
**REFRIGERATION
JOBBER**
or send check to

THE COOK CO.
Box 176, Columbus, Ohio



DENNIS GASKETS FOR ALL MAKES REFRIGERATOR DOORS



A complete line of
rubber - coated,
packed Gaskets and
extruded rubber Gaskets that last longer
—retain higher efficiency—because made
of finest materials and workmanship.
Write for free samples, giving your job-
ber's name and address.

W. J. DENNIS & CO.
2110-20 WEST LAKE ST. CHICAGO

SERVICE ENGINEER

REFRIGERATION • AIR CONDITIONING

EQUIPMENT • PARTS • MATERIALS • SUPPLIES AND ACCESSORIES

No Order too Small to Get FAST SERVICE from Large Stocks

Telephone **H. CHANNON COMPANY** 133 N. Wacker
Franklin 0380 Drive, Chicago

INDUSTRY BUYS CHANNON SUPPLIES

HERMETIC REBUILDING SERVICE

G.E.—Westinghouse and Majestic

Customers in 37 states had hermetically sealed units rebuilt or exchanged by us in the past year. Complete factory equipment for precision rebuilding. One year guarantee on all rebuilt units. Exchange service available on most makes and models. Write for prices and descriptive literature.

REX REFRIGERATION SERVICE, INC.
2226 S. State Street CHICAGO

Classified Ads

Rate: Two Dollars for fifty words or less.
30 cents for each additional ten words or less.

POSITION WANTED—I am an ambitious young man, age 24, technically inclined, graduate of a Chicago Technical High and a Refrigeration trade school. Now, I want a real opportunity in the field of Refrigeration or Air Conditioning. References: Address A. Merendino, 3658 Flournoy St., Chicago, Ill.

COMMERCIAL LINE REFRIGERATOR DISPLAY CASES—Walk-in coolers and refrigerators; also, direct-draw mechanically-cooled beer coolers. Sell with Ehrlich compressors or with any other make. Attractive discounts; also financing arrangements to help sell. 70 years in business. Write for full information. Ehrlich Refrigerator Mfg. Co., St. Joseph, Mo.

BOOKS FOR SALE—Write to Nickerson & Collins Co. for a complete list of books on Air Conditioning, Refrigeration, Ice Making, Cold Storage, Food Handling, Heating, Diesel, Oil, and Steam Engines, Domestic and Small Commercial Machines, and others. These are the best books published today on Refrigeration and related subjects. Nickerson & Collins Co., 435 N. Waller Ave., Chicago, Ill.

AIR CONDITIONING SIMPLIFIED—With the Air Condition Calculator. Everyone in the industry should have one. Eliminates the psychrometric chart. See April '38 R. S. E. page 30. Postpaid \$1.50, write Nickerson & Collins Co., 435 N. Waller Ave., Chicago, Ill.

R. S. DOBBINS, SPRINGFIELD, ILL., JOBBER DIES

RALPH S. DOBBINS, president of the United States Electric Company of Springfield, Illinois, one of the leading refrigeration parts jobbers of that city, died at his home on March 8th, 1939.

Mr. Dobbins' company is one of the largest independent wholesale electric firms in central Illinois.

He was interested in the local chapter of the R. S. E. S. and was one of its charter members.

Mr. Dobbins is survived by his wife, Lydia Quinlan Dobbins; two sons, David and Richard; and a sister, Mrs. Louise Stanley of Oroville, Wash.

H. H. CHAPLIN WITH SALES STAFF OF WOLVERINE TUBE CO.

MR. HOWARD H. CHAPLIN has been appointed, as of March 1st, to the sales staff of the Wolverine Tube Company, Detroit. Well known to the trade and with a background of over fifteen years in the jobbing business, he comes from American Radiator Company to Wolverine and will take charge of the wholesale trade in order to assist jobbers in taking advantage of the building increase that is being predicted for 1939 and has begun in many localities.

FRONT COVER

BELEVED to represent a novel departure in the manufacture of varying sizes of refrigerator door panels, a single hydraulic punching and stripping fixture has recently been placed in operation at the Nash-Kelvinator Corporation plant in Detroit. Designed by Progressive Welder

Motor Rewinding

for all types of hermetically sealed units our specialty

Complete stock of rewound stators for G. E., Grunow, Majestic and other refrigerators for immediate replacement. Write for prices.

Berdor Electric Co.
1317 N. Cicero Ave., Chicago

All Replacement Parts for



Electric Motors and Fans always in Stock

Send us 25c in stamps for our complete 108 page catalog, to cover postage — this amount will be credited on your first order. Write on your business letterhead.

COMPLETE ELECTRIC SUPPLY CO.

E. FOSTER
526 W. Van Buren, Chicago

Company, the fixture enables the punching of a minimum of 22 up to a maximum of 52 holes in the transverse flanges of five different size refrigerator door panels with but slight adjustments.

The fixture consists of 26 hydraulic punching units mounted on a machined steel base plate. Each unit can be readily moved in or out according to the size of the door panel to be punched.

The required number of punches for each individual punching unit for different panel sizes are contained in quick removable and interchangeable punch holding plates. Eight hydraulically operated hold-down pads serve to position and secure the work and prevent misalignment between punch and die.

A reciprocating power booster supplies the necessary pressure to punch, simultaneously, any number of holes up to the maximum number and operates from ordinary factory air line pressure of approximately 95 lbs. Stripping is mechanical, controlled by differential spring action within the individual punching and stripping units.

The fixture is push-button controlled and requires but two men for loading and operating. Average production is 200 door panels per hour of any of the five sizes.

SERVICE ENGINEER

ELECTRIMATIC SOLENOID VALVES

TYPE SP

for

FREON-METHYL—SO₂
WATER

3/8" F.P.T.

3/8" Orifice

Full 1/2" O D Tube
Capacity



Manual Opening Stem

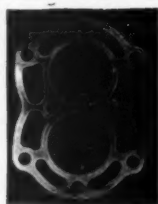
Operating Pressure 200 Lb.

Suction or Liquid Line

No Extra Charge for Special
Voltages

Catalog on Request

THE ELECTRIMATIC CORP.
2100 Indiana Ave., CHICAGO, ILL.



REPLACEMENT GASKETS

now put up in
SETS in space-
saving boxes.

Send for latest bulletin No. 40-B showing sets.
CHICAGO-WILCOX MFG. CO.
7701 S. AVALON AVE. CHICAGO, ILL.

COLD CONTROLS & EXPANSION VALVES

repaired or exchanged

at the following prices, F.O.B. Chicago

Automatic Expansion Valves (All Makes).....	\$1.25
Thermostatic Expansion Valves.....	3.00
Automatic Water Valves.....	2.50
Domestic Cold Controls (Modern Type)....	2.00
Commercial Controls (Temp. or Pressure)...	2.50
Commercial Dual Controls.....	3.00

ALL WORK GUARANTEED FOR 90 DAYS

Write for quantity prices

NEW DUTY

2424 Irving Park Blvd., CHICAGO

Index to Advertisements

Airo Refrigeration Parts.....	59	Kerotest Manufacturing Co.	38 and 39
Airo Supply Co.	53	Maguire Co., Wm. F.	58
Alco Valve Co.	64	Manufacturers Fin Coil Co.	56
Alter Co., The Harry.....	62	Marlo Coil Co.	63
Aluminum Ore Co.	4	Marsh Corp., James F.	63
Ansul Chemical Co.	43	Miller Rubber Co.	49
Automatic Heating & Cooling Supply Co.....	54	Mills Novelty Co.	45
Automatic Products Co.	6	Modern Equipment Corp.	2
Berdor Electric Co.	61	Modern Gas Co.	3
Blythe Co., H. W.	58	Mueller Brass Co.	7
Bonney Forge & Tool Works.....	Back Cover	New Duty	61
Capitol City Mfg. Co.	55	Peerless of America, Inc.....	Inside Back Cover
Channon Co., H.	60	Practical Instrument Co.	50
Chicago Eye Shield Co.	55	Ranco, Inc.	8
Chicago-Wilcox Mfg. Co.	61	R. & H. Chemicals Dept.	51
Commercial Coil & Refrigeration Co.....	54	Refrigeration Service, Inc.	39
Complete Electric Supply Co.	61	Refrigeration Supplies Co., Ltd.	58
Cook Co., The.....	59	Refrigeration Tool Co.	54
Dennis & Co., W. J.	59	Rempe Co.	57
Detroit Lubricator Co.	10	Rex Refrigeration Service, Inc.	60
Electromatic Corp., The.....	61	Rotary Seal Co.	Inside Front Cover
Fedders Manufacturing Co.	32 and 33	Snap-on Tools Corp.	46
Flushing Refrigeration Co.	53	Spoehrer-Lange Co.	42
G & G Majestic Parts Service.....	56	Syntron Co.	40
General Controls	52	Tecumseh Products Co.	41
Gilmer Co., L. H.	47	Trenton Auto Radiator Works.....	44
Hammond Drierite Co., W. A.	52	Utilities Engineering Institute.....	57
Henry Valve Co.	1	Virginia Smelting Co.	37
Imperial Brass Manufacturing Co.....	48	Wants, etc.	60
Jarrow Products Corp.	58	Weatherhead Co., The.....	5

It's New!

IMPORTANT

Send today for this big, new catalog of Air Conditioning and Refrigeration Parts and Supplies—JUST OFF THE PRESS—and full of real values. Please write on your letterhead. We only sell wholesale.

REFRIGERATION

PARTS AND SUPPLIES

SPRING
1939

CATALOG
NO 127

HARRY ALTER'S
DEPENDABOOK
 TOOLS • SUPPLIES
 EQUIPMENT FOR
 DOMESTIC REFRIGERATORS
 COMMERCIAL REFRIGERATION
 AND AIR CONDITIONING
WHOLESALE ONLY
 (Keep these Prices Confidential)
 Printed in the U.S.A.

The HARRY ALTER CO., INC.

Main Office and Warehouse
 1728 SOUTH MICHIGAN AVENUE
 CHICAGO, ILL., U. S. A.

THE HARRY ALTER CO.

1728 S. Michigan Avenue, Chicago, Illinois

3 CHICAGO BRANCHES — NORTH, WEST, SOUTH

NEW YORK

161-163 Grand St.

DETROIT

5013 John R. St.

CLEVELAND

4506 Prospect Ave.

ST. LOUIS

2910 Washington Ave.

For Sub-Zero Rooms

MARLO

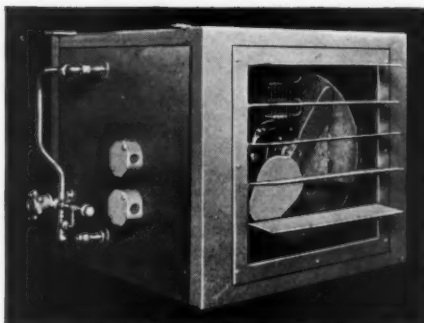
Low Temperature Units

The use of Electrical Heaters for quick defrosting of refrigeration coils was originated by this company and has been a feature of Marlo Low Temperature Units for a number of years.

By merely closing a switch, perfect defrosting is completed in 15 to 20 minutes.

You don't even have to remove contents of room—and no engineer is required. There is never the heavy accumulation of frost that occurs with other types of coil installations, thus assuring maximum efficiency at all times.

Marlo Units with automatic defrosting are available.



Marlo Low Temperature Units harden ice cream in 1/3 the time required by other coil installations. Temperatures as low as 20 degrees below zero may be had if desired.

Send for complete information and prices.

Marlo Coil Co., 6135 Manchester Ave., St. Louis, Mo.

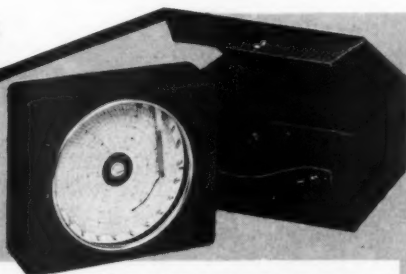
Manufacturers of Complete Line of Low Side Equipment

W-IR6

It's HERE—

only \$18.50

F.O.B. Chicago



A CAMERA-SIZE TEMPERATURE RECORDER

HERE is big recorder quality in a small moderately priced instrument. It is only 5"x6"x2 1/4" and weighs less than two pounds, yet it gives an accurate record easily read within one degree on 45° charts and within two degrees on the 90° chart. Clock and thermometer are extremely accurate and fully adjust-

able. New-type pen assures sharp graph. It is handsomely finished in satin black with chromium bezel and packed with fifty extra charts and bottle of special ink. Ranges are: -20° to +25°F; 0° to +45°F; +15° to 60°F; +45° to +90°F; +20° to +110° F. Carrying case only \$1.50 extra.

Write for new circular

JAS. P. MARSH CORP., 2089 Southport Ave., Chicago, Ill.

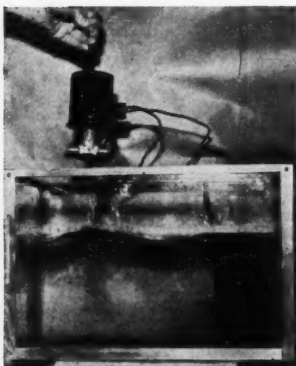
MARSH

Refrigeration Instruments



Announces a completely new line of— **Magnetic Stop Valves**

Fully Guaranteed Against Coil Burnout!



with

- Longer Life!
- Exceptional Stability!
- Greatest All-Round Performance!

Alco's completely new line of Magnetic Stop Valves has been proven by exhaustive tests to stand up under the most severe conditions and deliver a type of performance hitherto unequalled in the industry!

An amazing series of tests proved the ability of these valves to operate under water, at reduced voltages, at higher pressure differentials and under the most severe on and off service. As illustrated, valves

were placed in service and kept under water for more than six months with the current off and on, without coil failure. Breakdown tests showed these valves will operate 850,000 times without failure of any part—equaling an average valve life of ten years! Each valve is equipped with a "kick-off" spring that eliminates all difficulties due to residual magnetism and assures quick closing. Here at last are valves that are not only completely waterproof with Flamenol leads, but fully guaranteed against coil burnouts!

The new line includes valves for liquid and suction line refrigerant control for Freon, Methyl Chloride and Ammonia; also for brine, water, gas, air and steam. Yet with all these improvements, this new Alco series costs less than ever before.

It will pay you to get the complete story of the finest magnetic valves ever offered the industry. Write for free bulletin.

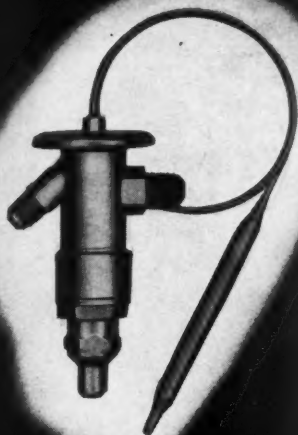
ALCO VALVE CO.

2630 Big Bend Blvd., St. Louis, Mo.

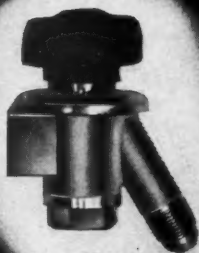
**ENGINEERED REFRIGERANT
CONTROLS**



**FOR HIGHEST EVAPORATOR
EFFICIENCY**



MODEL VN



MODEL VA

SAFETY SEALED
IN METAL CANS

NEW PEERLESS VALVES

REMOVABLE ORIFICE CARTRIDGE—BY USING THE PROPER SIZE ORIFICE CARTRIDGE YOU CAN MATCH THE MODEL V OR VS VALVE TO THE COIL AT THE TIME OF INSTALLATION.

MODEL V THERMAL EXPANSION VALVE WITH INTERCHANGEABLE ORIFICE CARTRIDGE

For those "hard to handle" jobs, the new Peerless Model V is pacing the field. It combines highly successful past performance with advanced engineering. It is now possible to match the valve to your equipment by using the PROPER SIZE ORIFICE CARTRIDGE.

MODEL VS THERMAL EXPANSION VALVE WITH INTERCHANGEABLE ORIFICE CARTRIDGE

For those fussy small jobs, choose Model VS Valves. They are ideal for places where space is at a premium, yet requiring a man-size performance. The price offers a great saving.

Use The Proper Size Orifice Cartridge.

MODEL VN THERMAL EXPANSION VALVE NON-ADJUSTABLE SUPERHEAT

Peerless Model VN Valves conform to specifications for factory-engineered refrigeration products. Maximum coil efficiency is assured by a predetermined superheat. It cannot be adjusted in the field.

MODEL VA AUTOMATIC EXPANSION VALVE ADJUSTMENT RANGE 20" VAC. TO 30 LB. GAUGE

Peerless has designed the Model VA Valve for small evaporators, beverage coolers and jobs of similar capacity. Its fundamental purpose is to feed refrigerant into the evaporator in correct proportions to maintain maximum evaporator efficiency without frost-back to the compressor unit. The flow of the refrigerant is stopped during the off-period.

ASK YOUR JOBBER FOR DETAILS, OR WRITE FOR OUR CATALOG

PEERLESS OF AMERICA, INC.

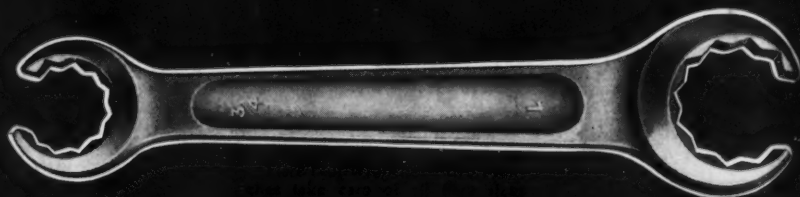
MIDWEST FACTORY, GENERAL OFFICES—515 W. 35TH STREET, CHICAGO

NEW YORK FACTORY
45-20 34th STREET
LONG ISLAND CITY

PACIFIC COAST FACTORY
3000 SOUTH MAIN STREET
LOS ANGELES, CALIF.

SOUTHWEST FACTORY
2218 N. HARWOOD ST.
DALLAS, TEXAS

EXPORT DIVISION
P. O. BOX 635
DETROIT, MICH.

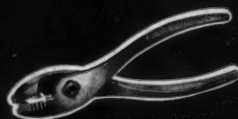
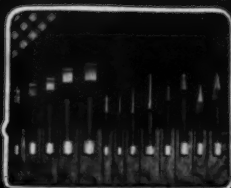
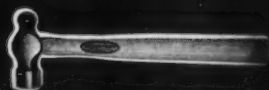
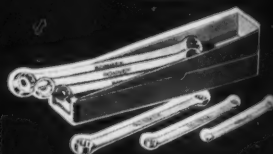


The Right Bonney Tool for Every Purpose

NO matter what your refrigeration service tool requirement may be, you're sure to find the right tool in the Bonney Line.

Designed especially for refrigeration work and made of the finest steels obtainable, service men everywhere recognize them as "The Finest That Money Can Buy."

See your jobber or write for complete catalog.



Bonney Tool Works, Allentown, Pa.

Representatives: The Bonney Tool Company, New York, N. Y.

Export Office: The Bonney Tool Company, New York, N. Y.

Worked for leading jobbers everywhere